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June 30, 1903.

CONSTITUTION AND BY-LAWS OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

CONSTITUTION.

ARTICLE I.

NAME AND OBJECTS.

The association shall be called the Cambridge Entomological Club, and its object shall be to cultivate the study of Entomology.

ARTICLE II.

ELECTION OF MEMBERS.

Members may be chosen at any regular meeting, after nomination, in writing, by two members at a preceding meeting, and the affirmative vote of two-thirds of the members present shall be necessary to a choice.

ARTICLE III.

RIGHTS OF RESIDENT MEMBERS.

Members residing in the neighborhood of Cambridge shall alone be entitled to vote or to hold office, or shall be subject to the payment of fees.

ARTICLE IV.

OFFICERS.

The officers shall be a President, Secretary, Treasurer, and an Executive Committee of five, of which the President, Secretary and Treasurer shall be members *ex officiis.*

ARTICLE V.

ELECTION OF OFFICERS.

Officers shall be chosen by ballot at a meeting designated for the purpose at least three weeks in advance, and a majority of the votes cast shall be sufficient for a choice.

ARTICLE VI.

AMENDMENTS.

The Constitution may be altered or amended by a two-thirds vote to that effect at any regular meeting of the Club, after a written proposition at a preceding meeting.

BY-LAWS.

ARTICLE I.

FEES.

The entrance fee shall be two dollars, and an assessment of the same amount shall be due January first of each year. The President and Treasurer may, at their discretion, exempt a member from assessment.

ARTICLE II.

TERMINATION OF MEMBERSHIP.

Members may withdraw from the Club by giving written notice of their intention and paying all arrearages due. A delay in the payment of any fee shall work forfeiture of membership, unless said fee is paid within one month after a written notice to that effect given at the end of the year.

ARTICLE III.

MEETINGS AND PROCEEDINGS.

Regular meetings of the Club shall be held on the second Friday of each month from October to June. Five members shall form a quorum for business. Officers shall be elected at the January meeting; at this meeting the retiring President shall give an address suitable to the occasion, the Secretary a written statement of the annual progress of the Club, and the Treasurer an account of its financial condition.

ARTICLE IV.

PUBLICATIONS.

The Club will publish a periodical, entitled PSYCHE, the general character of which shall be determined by the Club, and one or more Editors shall be chosen at the annual meeting.

ARTICLE V.

DUTIES OF OFFICERS.

The duties of the President, Secretary and Treasurer shall be those ordinarily required of such officers. The Executive Committee of five shall be the governing board of the Club in the intervals between the meetings; the members of this Committee chosen at large shall audit the accounts of the Treasurer. The Library shall be in charge of the Secretary.

ARTICLE VI.

AMENDMENTS.

The By-Laws of the Club may be altered, added to, or amended by a majority vote of the members present at any meeting; provided that they shall have been duly notified, at the previous meeting, of an intended change.

PSYCHE,

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

[Established in 1874.]

VOLUME 3.

1880–1882.

EDITED BY

G: DIMMOCK, *Cambridge, Mass.;* B: PICKMAN MANN, *Washington, D. C.;*
ALBERT J: COOK, *Lansing, Mich.;* CLIFFORD CHASE EATON, *Cambridge,*
Mass.; JOSEPH DUNCAN PUTNAM, *Davenport, Iowa;*
FRANCIS HUNTINGTON SNOW, *Lawrence, Kansas.*

CAMBRIDGE, MASS., U. S. A.
PUBLISHED BY GEORGE DIMMOCK.
1886.

The date of issue of each issue (single or compound numero) is given at the bottom of the last page of the succeeding issue; the last proofs of the final pages (part of nos. 103-104) of volume 3 were sent to the printer 10 Jan. 1887.

For the contents of this volume arranged in alphabetic order of authors see nos. 2941-3100 of the Bibliographical record, on pages 421-430.

The following list gives an explanation of the initials appended to the different numbers of the Bibliographical record, and, at the same time, serves as a list of persons who have contributed to the record.

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A. J: C.	Albert John Cook.
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G: D.	George Dimmock.
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PSYCHE,

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

[Established in 1874.]

EDITED BY

George Dimmock, *Cambridge Mass.;* B: Pickman Mann, *Cambridge, Mass.;*
Albert J: Cook, *Lansing, Mich.;* Clifford Chase Eaton,
Cambridge, Mass.

Vol. 3. No. 69.
January 1880.

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Cambridge, Mass., U. S. A.: Published by George Dimmock.

YEARLY SUBSCRIPTIONS, $1. MONTHLY NUMEROS, 15 c.

[Entered as second class mail matter.]

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B: PICKMAN MANN, Cambridge, Mass.

EARLY STAGES OF BUTTERFLIES WANTED.

The undersigned desires to obtain, by exchange or otherwise, from all parts of the world, eggs, caterpillars and chrysalids of Diurnal Lepidoptera. Dried specimens are preferred, especially of caterpillars, which should be prepared by inflation. Correspondence is invited with persons engaged in the study of the early stages of butterflies. S. H. SCUDDER, Cambridge, Mass.

ACKNOWLEDGMENTS.

The Cambridge Entomological Club gratefully acknowledges the receipt of the following contributions to the permanent publication fund.

Previously acknowledged,	$146.85
From S. H. Scudder, Cambridge, Mass. (Sale of specimens)	2.60
" E. T. Cresson, Philadelphia, Pa.	2.00
" E. A. Schwarz, Washington, D. C.	5.50
" H. F. Bassett, Waterbury, Conn.	.80
" H. K. Horton, Boston, Mass.	10.00
Total,	$167.75

PSYCHE.

EXPERIMENTS UPON THE EFFECT OF COLD APPLIED TO CHRYSALIDS OF BUTTERFLIES.

BY WILLIAM HENRY EDWARDS, COALBURGH, W. VA.

1. In May 1878, I placed many chrysalids of *Papilio ajax*, from eggs laid by form *walshii*, in the ice box. The youngest were aged but 10 to 15 minutes after pupation and were still soft; others were added at intervals up to the age of 24 hours (the chrysalis is hard at about 12 hours), and others yet at 2 days, 3 days and so on to 8 days after pupation. All were removed from the box on the same day. The exposure had been from 19 to 5 days, those chrysalids which were put in latest generally having had the shortest exposure. I wished to determine, if possible, whether, in order to effect any change, it was necessary that cold should be applied immediately after pupation, or if one or several days might intervene between pupation and icing. Inasmuch as no color begins to show itself in the pupa till a few hours, or at most a day or two, before the butterfly emerges, I thought it possible that cold applied shortly before that time might be quite as effective as if applied earlier, and particularly very soon after pupation. The result was that more than half the youngest and immature chrysalids died; one which had been exposed at 10 minutes after pupation, two at 1 hour, one at 2 hours, two at 3 hours. On the other hand, one exposed at 15 minutes, one at 2 hours, and one at 12 hours, produced butterflies. The temperature was from 32° to 34° F. [0° to 1° C.] most of the time, rising somewhat daily as the ice melted. The normal chrysalis period in this species is from 11 to 14 days, in case the butterfly emerges the same season, but now and then a single butterfly will emerge several weeks after pupation. The latter is an uncommon occurrence, however, as usually the chrysalids which do not give imagos within 14 days retain them till the following spring. The form which would naturally emerge the first season from these chrysalids is *marcellus*, but all the overwintering chrysalids would produce *telamonides* or *walshii*, which latter are the winter forms of the species. If then, from the chrysalids subjected to cold, the winter form should emerge the same season, it would be owing to the exposure to cold.

On the 14th day after taking the chrysalids from the ice, one *telamonides* emerged, from a chrysalis placed in the ice box 3 days after pupation, and kept there 16 days.

On the 19th day, emerged one *telamonides*, or a form between that and *walshii*, from a chrysalis put in the box 12 hours after pupation and kept there 11 days. On the 19th day emerged one *walshii*, from chrysalis 2 hours old, and on ice 11 days. All the rest emerged unchanged *marcellus*, but at periods prolonged in a surprising way: —

One on 43d day, exposed at 15 minutes.
One on 46th day, exposed at 2 hours.
One on 53d day, exposed at 24 hours.
One on 62d day, exposed at 6 days.
One on 63d day, exposed at 4 days.
One on 66th day, exposed at 7 days.
One on 77th day, exposed at 4 days.
One on 81st day, exposed at 12 hours.
One on 91st day, exposed at 5 days.
One on 96th day, exposed at 19 hours.

Five chrysalids lived over until the spring of 1879, when all produced *telamonides.*

2. In June 1879, I obtained eggs of the form *marcellus*, and in due time had from them 104 chrysalids. I placed about one third, or 35, in the ice box, at from 12 to 24 hours after pupation, dividing them into three lots: 1st, 9 chrysalids, kept on ice 14 days; 2nd, 12 chrysalids, 20 days; 3d, 11 chrysalids, 25 days. Temperature and conditions the same as in experiment No. 1.

Of the 69 chrysalids not exposed to cold, 34 gave butterflies at from 11 to 14 days after pupation, and one additional example emerged 11 Aug., or at least 22 days past the regular period. I reserved these chrysalids that I might be able to compare the butterflies from these with the butterflies from the same lot of eggs, but whose chrysalids were iced.

Of the chrysalids on ice, from lot No. 1, emerged 4 ♀ at 8½ to 9½ days after removal from the ice, and 5 are now living and will pass the winter. From lot No. 2, emerged 1 ♂ 5 ♀, at 8 to 9 days; another ♀ came out at 40 days, and 5 go over the winter. From lot No. 3, emerged 4 ♀, at 9 to 12 days; another ♂ at 54 days, and 6 were found to be dead.

In this experiment, I wished to see, as exactly as possible: 1st, in what points changes would occur; 2d, if there would be any change in the shape of the wings, as well as in markings and coloration, — that is, whether the shape might remain that of *marcellus*, while the markings might be of *telamonides* or *walshii*, or a summer form with winter markings — (in previous experiments I had not noted this point so carefully as I wished now to do); 3d, to ascertain more closely than I had yet done what length of exposure to cold was required to bring about a decided change, and what would be the effect of prolonging that period. After my experiments with *Phyciodes tharos*, as shown in Butterflies of N. A., v. 2, and which had resulted in a suffusion of color, I hoped that I might see a similar change in *Papilio ajax*, brought about either by the low temperature or prolonged exposure.

I obtained from these chrysalids 11 perfect butterflies, 1 ♂ 10 ♀. Some others emerged crippled, and these I rejected, as it was not possible to make out their markings satisfactorily. From lot No. 1, 14 days: 1 ♀ between *marcellus* and *telamonides*, 2 ♀ *marcellus.* These latter were pale colored, the light parts a dirty white, the submarginal lunules on hind wing only two in number and small, at anal angle one large and one small red spot, and the frontal hairs very short.

The black of the first, or intermediate, female was also pale, but the light parts were more green and less sordid; there were three large lunules, the anal red spot was double and connected as in *telamonides*, the frontal hairs were short as in *marcellus*. I find these the most salient points for comparing the several forms of *P. ajax*. In nature there is much difference in shape also between *marcellus* and *telamonides*, still more between *marcellus* and *walshii*, and the latter may be distinguished readily from *telamonides* by the white tips of the black tails. In *telamonides* the white edges both sides of the tail. *Walshii* is smaller and the anal spot is larger and edged with white on upper side, and the frontal hairs are long and brush-like and black. In *marcellus* they are very short and with much yellow; in *telamonides* they are of a length between the other two, black with yellow next the eyes.

From lot No. 2, 20 days, came: 1 ♀ *marcellus*, with single red spot; 1 ♀ between *marcellus* and *telamonides*, the colors pale, the lunules all obsolescent, two large red spots but not connected, frontal hairs of medium length, as in *telamonides;* 1 ♀ between *marcellus* and *telamonides*, color not pale, but black and green, three lunules, two large red spots, frontal hairs short; 1 ♀ *telamonides*, colors black and green, four lunules, a large double and connected red spot, frontal hairs medium; 2 ♀ *telamonides*, colors like last, three and four lunules, two large red spots, not connected, frontal hairs medium.

From lot No 3, 25 days: 1 ♂ *telamonides*, clear colors, four large lunules, one large and one small red spot, frontal hairs long; 1 ♀ *telamonides*, of medium color, four lunules, large double and connected red spot, frontal hairs long.

In general shape all are *marcellus*, the wings produced, the tails long.

By which it appears that those exposed 25 days were fully changed; of those exposed 20 days, three were fully, two partly changed, and one not at all. Of those exposed 14 days, one partly, two not at all.

The butterflies from this lot of 104 chrysalids, but which were not subjected to cold, were put in papers as they emerged. Taking 6 ♂ 6 ♀ from the papers, as they came to hand, I spread them and compared with the iced examples.

Of the 6 ♂, 4 have one red anal spot only, 2 have one large and one small; 4 have two green submarginal lunules on hind wing, 2 have three, and these latter have a fourth, which is obsolescent, at outer angle; all have short frontal hairs.

Of the 6 ♀, 5 have but one red spot, 1 has one large and one small spot; 5 have two lunules only, 1 has three; all have short frontal hairs.

Comparing 6 of the females from the iced chrysalids, being those in which a decided change occurred, with the 6 females not iced: —

1. All the former have the colors more intense, the black blacker, the light, green.

2. In 5 of the former the green lunules on hind wings are decidedly larger; 3 of the 6 have four distinct lunules, 1 has three, 1 has three, and a fourth, at outer angle, obsolescent.

Of the 6 not iced, none have four, 2 have two, and a third, being the lowest of the row, obsolescent, 3 have three, the lowest being very small, 1 has three and a fourth, at outer angle, obsolescent.

3. In all the former the subapical spot on fore wing and the stripe on same wing which crosses cell inside the common black band, are distinct and green; in all the latter these marks are either obscure or obsolescent.

4. In 4 of the former there is a large double and connected red spot at anal angle, and in 1 of them it is edged on its upper side by white; 2 have one large and one small red spot. Of the latter, 5 have one spot only, and the 6th has one spot and a red dot.

5. The former have all the black portions of the wing of deeper color but of less extent — the bands being narrower; on the other hand, the green bands are wider as well as deeper and clearer colored. Measuring the width of the outermost common green band along middle of upper median interspace on fore wing in tenths of a millimetre, I find it as follows: —

On iced chrysalids, 81, 66, 76, 76, 66, 66.

On not iced, 56, 56, 51, 51, 46, 51.

Measuring the common black discal band along middle of lower median interspace on same wing: —

On the iced, 51, 66, 51, 51, 56, 61.

On the not iced, 76, 71, 66, 63, 71, 76.

In other words, the natural examples are more melanic than the others.

I find no difference in length of tails or in the length and breadth of the wings. The cold has produced no effect in the shape of the wings.

Comparing 1 male from the iced chrysalids with the 6 males not iced: —

1. The former is bright colored; 2 of the latter are the same, 4 have the black pale, the light pale and sordid.

2. The former has four lunules; 3 of the latter have three, 3 have two only.

3. The former has a large double connected red anal spot, edged with white; 3 of the latter have but one red spot, 2 have one large and one small spot, 1 has one large red spot and a red dot.

4. The former has the subapical spot and stripe in cell clear green; 1 of the latter has the same, 5 have these obscure or obsolescent.

Looking over all, of both sexes, in both lots, the iced and not iced, the largeness of the green submarginal lunules on fore wings in the iced examples is conspicuous as compared with all the others, — though this feature is included in the general widening of the green bands spoken of.

In all my experiments at any time made with *P. ajax*, if any change at all has been produced by cold, it is seen in the enlarging or doubling of the red anal spot, and in the increased number of clear green lunules on hind wings. Almost always the frontal hairs are lengthened, the color of the wings deepened. So also the extent of the black area is diminished. All these changes are in the direction of *telamonides*, or the winter form.

That the effect of cold is not simply to precipitate the emerging of the winter form, making the butterfly which would naturally leave its chrysalis in the succeeding spring to emerge in the season in which it fed as a caterpillar, is evident from the fact that the shape is always that of the summer form, while the markings are of the winter form. Those chrysalids which go over the winter, on the other hand, do not have the summer form, but the winter, and the markings agreeing thereto, just as in examples in nature. On these the cold has produced no effect whatever.

(*To be continued on p.* 15.)

PSYCHE.

CAMBRIDGE, MASS., JANUARY 1880.

Communications, exchanges and editors' copies should be addressed to EDITORS OF PSYCHE, *Cambridge, Mass. Communications for publication in* PSYCHE *must be properly authenticated, and no anonymous articles will be published.*

Editors and contributors are only responsible for the statements made in their own communications.

Works on subjects not related to entomology will not be reviewed in PSYCHE.

For rates of subscription and of advertising, see advertising columns.

INTRODUCTORY.

THE THIRD volume of PSYCHE will appear in the form in which this numero is given to the public. With the improvements which this change of form admits in the BIBLIOGRAPHICAL RECORD, and the increased amount of matter presented to the public in each numero, the editors hope to make PSYCHE still more acceptable than it has been heretofore to its readers.

Although the CAMBRIDGE ENTOMOLOGICAL CLUB, of which PSYCHE is the official organ, is a society bearing a local name, its members are chosen without local limitation, and PSYCHE will endeavor to represent the interests of scientific entomology wherever pursued, and to advance, impartially, the welfare of all societies having the same objects in view.

Systematic or descriptive, and economic entomology are fields so well occupied already by other American entomological publications, that PSYCHE is justified in devoting itself, as heretofore, to the general anatomy and physiology of arthropoda and to bibliographical and biological entomology. Faunal lists, heretofore sparingly admitted in PSYCHE, will hereafter be excluded, not because they lack in value, but because they are of no interest to the majority of the readers to whom PSYCHE proposes to address itself.

More attention than heretofore will be given in PSYCHE to items concerning the latest scientific discoveries in entomology, the proceedings of societies, and the doings of entomologists. Brief items, and condensed abstracts of the proceedings of scientific societies in all parts of the world, so far as they are related to general entomology, would be thankfully received by the editors. Official notices of the times of meetings of entomological societies will be inserted in our column devoted to that purpose, free of charge.

The BIBLIOGRAPHICAL RECORD, in consequence of the new arrangement, will contain yearly about three times as many references as heretofore, and these will be given in a much more convenient form. It will be compiled by a larger number of workers, guided by printed rules to secure uniformity, and will be much more complete than any similar record ever before attempted. In order to perfect this record the editors respectfully request copies of miscellaneous papers containing entomological articles that would naturally otherwise be overlooked. *G. D.*

ANNOUNCEMENT.

THE FEBRUARY numero of PSYCHE will contain a list, complete as the editors can make it, of the entomological writers who have died during the year 1879. *G. D.*

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [ ], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor.

A colon after initial designates the most common given name, as: A: Augustus; B: Benjamin; C: Charles; D: David; E: Edward; F: Frederic; G: George; H: Henry; I: Isaac; J: John; K: Karl; L: Louis; M: Mark; N: Nicholas; O: Otto; P: Peter; R: Richard; S: Samuel; T: Thomas; W: William. The initials at the end of each record, or note, are those of the recorder, and will be explained at the end of each volume. Unless otherwise stated each record is made directly from the work that is noticed.

When there are not sufficient titles of current papers to fill the space allotted to the Record, earlier entomological publications will be recorded. In this way it is expected to include, finally, in the Record, all titles of papers not included in Hagen's Bibliotheca entomologica, which treat of North American or general entomology, and all papers on entomology published in North America.

Corrections of errors and notices of omissions are solicited.

African insect scourge (The). The tsetse fly. (Journ. applied sci., May 1879, v. 10, p. 74–75, 52 cm.)

Notice. (Psyche advert., July 1879, p. 7–8.)

Habits of *glossina morsitans*, mostly compiled from the works of Dr. David Livingstone. *G: D.* (1447)

Ashmead, W: H. On a new *psocus*. (Can. entom., Dec. 1879, v. 11, p. 228–229.)

Describes *ps. citricola* n. sp.; habits of young. *B: P. M.* (1448)

[**Blatta orientalis** used for dropsy.] (New remedies, March 1879, v. 8, p. 67, 6 cm.) (Psyche advert., May–June 1879, p. 8.) *G: D.* (1449)

Blue grasshoppers. ("Esmeralda herald," . . .) ([D.] times-review, Tuscarora, Elko Co., Nev., 17 Sept. 1879, v. 4, no. 67, p. [3], col. 3^4, 5 cm.)

Occurrence of locusts "with wings and the under part of the body of a pale blue or lavender color" at Esmeralda, Nev. *B: P. M.* (1450)

Brandt, Eduard. Ueber die Metamorphosen des Nervensystems der Insecten. Mit 2 photolithographirten Tafeln. Separatabdruck aus den "Horae societatis entomologicae rossicae." Bd. xv, 1879. St. Petersburg, 1879. t.-p. cover, 11 p., 25 × 17, t 18 × 10.8, pl. 5–6, 31 × 21.

A general and comparative view of the metamorphoses of the nervous system of insects of the different orders. The author's researches were upon "62" species of insects, distributed as follows: hymenoptera, 15; coleoptera, 12; lepidoptera, 8; diptera, 12; archiptera, 2; neuroptera, 1. Literature (19 titles). Figures the metamorphoses of the nervous system in *sarcophaga carnaria*, *syrphus ribesii*, *stratiomys chamaeleon*, *melolontha vulgaris*, *acilius sulcatus*, and *formica rufa*. *G: D.* (1451)

Brandt, Eduard. Untersuchungen über das Nervensystem der Dipteren. [Separatabdruck aus den "Horae societatis entomologicae rossicae." Bd. xiv., 1879.] St. Petersburg, 1879. 4 p., 25 × 16, t 18 × 10.8, pl. 1–4.

A brief summary of the results recorded in E. Brandt's "Vergleichend-anatomische Untersuchungen über das Nervensystem der Zweiflügler (Diptera)." *G: D.* (1452)

Brandt, Eduard. Vergleichend-anatomische Skizze des Nervensystems der Insekten. Mit 2 photolithographirten Tafeln. Separatabdruck aus den "Horae societatis entomologicae rossicae." Bd. xv [? xiv], 1879. St. Petersburg, 1879. t.-p. cover, 17 p., 25 × 17, t 18 × 10.8, pl. 3–4.

Distribution of nerves and ganglia. Some insects have no infraoesophageal ganglia. Convolutions of the brain are found in every order of insects, and sometimes differ between individuals of the same species. The size of the supraoesophageal ganglion is very different in different insects, and is larger the more the faceted eyes are developed. It is incorrect to call the supraoesophageal ganglia alone the brain; the development shows that the supraoesophageal and infraoesophageal ganglia, together, form the brain, or head-portion of the nervous system. The nerves of the labrum do not arise from the under surface of the supraoesophageal ganglion, but from the oesophageal ring. Distribution of the thoracic and abdominal ganglia. The number of ganglia differ, not only in different species but also in the different individuals of a species, according to sex. The last abdominal ganglion is not, in all insects, the most complicated; the penultimate is often the most complicated abdominal ganglion (e. g., in the worker of *apis mellifica*); the first is the most complicated abdominal ganglion in some insects (e. g., in *carabus*). No insect, nor larva, has as many nerve-ganglia as it has body-segments; only in embryos do the number of body-segments and ganglia agree. Sympathetic system. Classification and explanation of the principal types of nerve-systems in embryos, in larvae, and in imagos. Morphological signification of different ganglia. Literature (44 titles). Illustrates the different types of nerve-system by 25 schematic figures; figures the nerve-systems of *bombus muscorum* and *apis mellifica*. *G: D.* (1453)

Brandt, Eduard. Vergleichend-anatomische Untersuchungen über das Nervensystem der Hemipteren. Mit 1 photolithographirten Tafel. Separatabdruck aus den "Horae societatis entomologicae rossicae." Bd. xiv, 1879. St. Petersburg, 1879. t.-p. cover, 10 p., 25 × 17, t 18 × 10.8, pl. 4, 31 × 21.

General characters, development, and classification into 5 types, of the nervous system of hemiptera, based on the study of 70 species. Literature (17 titles). Figures the nervous system of 11 species. *G: D.* (1454)

Brandt, Eduard. Vergleichend-anatomische Untersuchungen über das Nervensystem der Hymenopteren. Mit 1 [4] photolithographirten Tafel[n]. Separatabdruck aus den "Horae societatis entomologicae rossicae." Bd. xiv, 1879. St. Petersburg, 1879. t.-p. cover, 20 p., 25 × 17, t 18 × 10.8, pl. 7–10.

General characters, development, and classification into 10 types, of the nervous system of hymenoptera, based on the study of 200 species, of 31 larvae, and of its metamorphoses in 15 species. Literature (46 titles). Figures the nervous system of 10 species, its metamorphoses in 2 species, and gives 13 figures of much enlarged separate portions. *G: D.* (1455)

Brandt, Eduard. Vergleichend-anatomische Untersuchungen über das Nervensystem der Käfer, Coleoptera. Mit 3 photolithographirten Tafeln. Separatabdruck aus den "Horae societatis entomologicae rossicae." Bd. xv, 1879. St. Petersburg, 1879. t.-p. cover, 17 p., 25 × 17, t 18 × 10.8, pl. 10–12.

General characters, development, and classification into 4 types, of the nervous system of coleoptera, based upon a study of 235 species, of 36 species in the larval, and 12 in the pupal state. Literature (43 titles). Figures the nervous system of 24 species, of 3 larvae, and its metamorphoses in 2 species. *G: D.* (1456)

Brandt, Eduard. Vergleichend-anatomische Untersuchungen über das Nervensystem der Lepidopteren. Mit 1 photolithographirten Tafel. Separatabdruck aus den "Horae societatis entomologicae rossicae." Bd. xv, 1879. St. Petersburg, 1879. t.-p. cover, 16 p., 25 × 17, t 18 × 10.8, pl. 14, 37 × 31.

General characters, development, classification into 4 types, and characters in the principal families, of the nervous system of lepidoptera, based upon a study of 118 species, of 42 larvae, and its metamorphoses in 8 species. Literature (31 titles). Figures the nervous system of *odonestis potatoria* ♂, *orgyia antiqua* ♀, *zygaena trifolii* ♀, *hepiolus humuli* ♀, of young and of full-grown larva of *cossus ligniperda;* its metamorphoses in *vanessa urticae.* *G: D.* (1457)

Brandt, Eduard. Vergleichend-anatomische Untersuchungen über das Nervensystem der Zweiflügler, Diptera. Mit 4 photolithographirten Tafeln. Separatabdruck aus den "Horae societatis entomologicae rossicae." Bd. xv, 1879. St. Petersburg, 1879. t.-p. cover, 18 p., 25 × 17, t 18 × 10.8, pl. 15–18.

General characters, development, characters in different families, and classification into 6 types, of the nervous system of diptera, based upon a study of 275 species, of 29 species in the larval and of 12 in the pupal state. Figures the nervous system of 26 species, of 5 larvae, and its metamorphoses in 7 species. The results are given more briefly in E. Brandt's "Untersuchungen über das Nervensystem der Dipteren." *G: D.* (1458)

Brous, Harry A. Habits of *amblychila cylindriformis.* (Trans. Kansas acad. sci., 1877, v. 5, p. 11–12, fig.)

Includes description and figure. *G: D.* (1459)

Castor-oil plant [*ricinus communis*] (The). (Colonies and India, 5 April 1879, suppl., p. 2, 21 cm.)

Statement (1 cm.) that *bombyx arrindi* requires *ricinus* for food. *G: D.* (1460)

Ceylon coffee blight [*hemileia vastatrix*] (The). (Colonies and India, 11 Jan. 1879, p. 13, 28 cm.)

Quotes (3.5 cm.) remarks by Joseph Dalton Hooker upon the conditions furnished by cultivation of plants for the spread of noxious insects. [Hemileia is a fungus.] *G: D.* (1461)

Clothes moth (The). (Journ. applied sci., Feb. 1879, v. 10, p. 25–26, 57 cm.)

Habits and transformations of *tinea tapetzella, t. bisselliella* (or *t. crinella*), and *t. pellionella.* Reprinted from *The warehouseman.* *G: D.* (1462)

Edwards, W: H: [*Danais archippus* swarming.] (Can. entom., Dec. 1879, v. 11, p. 239.)

Quotes a statement from A. H. Mundt that large numbers of *d. archippus* remained congregated on the branches of a tree for some days in Sept. 1879, at Fairbury, Ill. *B: P. M.* (1463)

Edwards, W: H: Description of a new species of *pamphila.* (Can. entom., Dec. 1879, v. 11, p. 238–239.)

Describes *p. dion* n. sp. *B: P. M.* (1464)

Edwards, W: H: On the larval habits of *limenitis arthemis,* with its co-form *proserpina,* and also of *l. disippus.* From advance sheets of part 8, vol. 2, of Butterflies of North America. (Can. entom., Dec. 1879, v. 11, p. 224–228.)

Food-plants and method of constructing the hibernacula. *B: P. M.* (1465)

Entomological society of Ontario — *Montreal branch.* [6th annual general meeting, and report of the council.] (Can. entom., Dec. 1879, v. 11, p. 229–231.)

Proceedings, election of officers, annual report. *B: P. M.* (1466)

Freeman, F: The history of Cape Cod [Mass.]: the annals of Barnstable county and of its several towns, including the district of Mashpee. 2 v., Bost., [1860–1864]. *Each v.* 803 p., 25 × 16, t 17 × 9.5.

Describes (v. 1, p. 524, foot-note) the French soldiers, in the American camp at West Point, during the Revolution, roasting and eating grasshoppers. This foot-note is quoted in *Psyche advertiser,* July 1879, p. 9–10. *G: D.* (1467)

Grasshopper raid in Shasta. ("Yreka journal," 6 Aug. 1879.) (Weekly bulletin, San Francisco, Cal., 14 Aug. 1879, v. 24, no. 29, . . . 6 cm.)

Ravages of locusts near Shasta, Cal. *B: P. M.* (1468)

Grasshoppers and the dairy farmers. ("Truckee republican," 6 Aug. 1879, . . .) (Weekly bulletin, San Francisco, Cal., 14 Aug. 1879, v. 24, no. 29, . . . , 7 cm.)

The ravages of locusts in the mountains and valleys around Truckee, Cal., have obliged the dairymen to seek new pastures for their cattle. *B: P. M.* (1469)

Grote, A: Radcliffe. The species of *erotyla, spragueia, fruva, xanthoptera, exyra* and *prothymia.* (Can. entom., Dec. 1879, v. 11, p. 231–238.)

Describes the neuration of most of the species, with descriptive and synonymical notes; catalog of the species. *B: P. M.* (1470)

Hagen, Hermann August. Among the bugs. A forenoon with an entomologist. Interesting facts about insects in general and one in particular. (Bost. evening journ., 11 July 1879, v. 46, no. 15283, p. [1], col. 6–7, 96 cm.)

Account of a visit to Dr. Hagen, at the Museum of comparative zoology, Cambridge, Mass.; habits of *anthrenus scrophulariae*, and means against it. *B: P. M.* (1471)

Hagen, Hermann August. Museum pests. (Journ. applied sci., June 1879, v. 10, p. 90–91, 104 cm.)

Reprint of the author's "Museum pests observed in the entomological collection at Cambridge [Mass.]" [Psyche, Rec., no. 1473], *q. v.* *G: D.* (1472)

Hagen, Hermann August. Museum pests observed in the entomological collection at Cambridge [Mass.]. (Proc. Bost. soc. nat. hist., Jan. [5 Feb.] 1879, v. 20, p. 56–62.)

Abstract. (Nature, 29 May 1879, v. 20, p. 106, 17 cm.)

Reprint, entitled, "Museum-pests." (Journ. applied sci., June 1879, v. 10, p. 90–91, 104 cm.)

Treats of species of *dermestes, attagenus, anthrenus, ptinus, tribolium, sylvanus, tinea, atropus, clothilla*, an acarus (probably *tyroglyphus*), *psocus* and *oecophora;* compares the ravages of insects in European with those in American collections. *G: D.* (1473)

Hagen, Hermann August. The yellow fever fly. (Boston d. advertiser, 21 July 1879, no. 22121, v. 133, no. 173, p. [1], col. 3.)

Information sought about a fly which appears at the times of outbreak of yellow fever in the southern United States. *B: P. M.* (1474)

Heustis, Caroline Eliza. [*Papilio thoas.*] (Can. entom., Dec. 1879, v. 11, p. 239–240.)

Dates of pupation and imagination of *p. thoas* in New Brunswick. *B: P. M.* (1475)

Insect pest to the fruit crop of Santa Clara Valley (An). ("San Jose times," 10 Aug. 1879.) (Weekly bulletin, San Francisco, Cal., 14 Aug. 1879, v. 24, no. 29, . . . , 17 cm.)

Also entitled, "A pest to the apple and pear crop of the Santa Clara valley." The "red scale louse" or "red scale," first noticed near San Jose, Cal., 3 or 4 years ago, supposed to have been imported on Sicily oranges, very destructive to apple trees and pear trees; its habits; means of destroying it. *Carpocapsa pomonella*, recently imported, also destructive. *B: P. M.* (1476)

Moffat, J. Alston. [*Papilio thoas.*] (Can. entom., Dec. 1879, v. 11, p. 240.)

P. thoas feeding on *dictamnus fraxinella* at Hamilton, Ont. *B: P. M.* (1477)

Morris, Ernest. Insect pests of the Amazon. (Charlestown [Mass.] news, 17 May 1879, v. 1, no. 37, . . . , 42 cm.)

Mention of the personal annoyances caused by insects in the valley of the Amazon. *B: P. M.* (1478)

Niin insect of Yucatan (The). (Journ. applied sci., Feb. 1879, v. 10, p. 24–25, 89 cm.)

Abstract. (Colonies and India, 26 Apr. 1879, p. 9, 15 cm.)

Notice. (Psyche advert., March 1879, p. 8.)

Chemical nature, source, and uses as drying oil and as waterproof varnish, of niin, the secretion of an insect supposed to be allied to *coccus cochinillifera.* Facts on the authority of Dr. Arthur Schott, of the scientific commission of Yucatan. *G; D.* (1479)

Notes on commercial drugs and chemicals. (New remedies, June 1879, v. 8, p. 164–165, 55 cm.)

Brief commercial notes on *blatta orientalis* as a remedy for dropsy (3 cm.), and on insect powder from *chrysanthemum* and *pyrethrum* (3 cm.), with its great advance in price early in 1879. *G: D.* (1480)

Oil-producing insect (A new). (Colonies and India, 26 April 1879, p. 9, 15 cm.)

Notes on niin, the fatty product of a species of *coccus.* See "Niin insect of Yucatan." *G: D.* (1481)

Plague of locusts in Russia (A). ("London times.") (Weekly bulletin, San Francisco, Cal., 14 Aug. 1879, v. 24, no. 29, . . . 11 cm.)

A little about the ravages of locusts, and more about other subjects. *B: P. M.* (1482)

Plant-producing caterpillar of New Zealand (The). (Colonies and India, 11 Jan. 1879, p. 9, 12 cm.) (Journ. applied sci., Feb. 1879, p. 23–24, 13 cm.)

Notice. (Psyche advert., March 1879, p. 8.)

Growth of *sphaeria robertsii* from larva of *hepialus virescens.* *G: D.* (1483)

Reeling silk by electricity. (Colonies and India, 11 Jan. 1879, p. 72, 4 cm.)

The breaking of a single filament of silk breaks a current of electricity, and, by suitable alarms, warns an attendant. From *The electrician.* *G: D.* (1484)

"**ROOT,** L. C. Quinby's new bee-keeping: mysteries of bee-keeping explained; combining results of fifty years' experience, with latest discoveries and inventions, and presenting most approved methods; forming complete guide to successful bee-culture. N. Y., Orange Judd co., 1879. 270 p., por., D. il. cl., $1.50.

"1st ed. of [M.] Quinby's work appeared 1866; just before his death he was contemplating a new edition presenting new methods and processes tested and adopted by him. L. C. Root, his son-in-law, who was perfectly familiar with his later views, embodies them here, besides giving the results of his own experience." —*Title-slip registry*, May [June] 1879, v. 1, p. 45. (1485)

Rural (*pseud.*). The wheat midge. (Ellsworth [Me.] American, 4 Sept. 1879, no. 1281, v. 25, no. 36, p. [4], col. 1, 45 cm.)

Practical statement of the differences between the wheat midge (*cecidomyia tritici*) the Hessian fly (*c. destructor*) and the wheat weevil (*sitophilus granarius*); means of opposing the midge. *B: P. M.* (1486)

Saunders, W: Entomology for beginners. (Can. entom., Dec. 1879, v. 11, p. 221–223, fig. 13–14.)

Proposal to prepare a series of articles adapted especially to beginners; figures *dytiscus harrisii* and *hydrophilus triangularis*, describes the former; habits of the former and of *h. piceus* of Europe. *B: P. M.* I(487)

ENTOMOLOGICAL ITEMS.

The index of volume 2 of Psyche, which requires considerable care and time in its preparation. will be forwarded to all subscribers to that volume as soon as it is printed.

The Dollfus prize of the Entomological Society of France was awarded last year to MM. Mulsant and Rey for their Histoire naturelle des coléoptères de France.

The library of the Cambridge Entomological Club has been placed in the charge of Mr. C. C. Eaton, of Cambridge, Mass., for whose zealous and punctual labors the members of the club have reason to be thankful.

Mr. G. Dimmock left America, 26 July 1879, for Europe, and may be addressed at Leipzig, Germany, for the season of 1879–1880. Upon business connected with Psyche, he may be addressed at Cambridge, Mass., U. S. A.

SOCIETY MEETINGS.

The regular meetings of the Cambridge Entomological Club will be held at 19 Follen St., at 7.45 p. m., on the days following: —

9 Jan. 1880.
13 Feb. „
12 Mar. „
9 April 1880.
14 May „
11 June „

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following: —

28 Jan. 1880.
25 Feb. „
24 Mar. „
28 Apr. 1880.
26 May „

B: Pickman Mann, *Secretary.*

The annual meetings of the Entomological Section of the American Association for the Advancement of Science will begin at 2 p. m., on Tuesday, 24 Aug. 1880, at a place yet to be determined, in Boston, Mass. Members who intend to present communications that may provoke discussion are requested to allow the Secretary to announce their subjects, in order that other members may come ready to enter into a thorough discussion.

B: Pickman Mann, *Secretary,*
Cambridge, Mass.

The regular meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following: —

9 Jan. 1880.
13 Feb. „
12 Mar. „
9 Apr. 1880.
14 May „
11 June „

James H. Ridings,
Recorder.

The semi-annual meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following: —

8 Dec. 1879.
14 June 1880.

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Recording Secretary.

ADVERTISEMENTS

should reach the editors by the 10th of the month preceding the one in which they are to appear.

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VI. Jahrg. 1880.

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Copies of this numero of Psyche will be sent to a large number of entomologists in Europe and America, in order to show its change of form. Psyche, although the organ of a club having a local name, will continue to be devoted to general rather than to local entomology. Its editors solicit communications from entomologists in all parts of the world on the general anatomy, physiology and biology of insects; also articles, items, and brief accounts of the proceedings of societies, so far as they are of general interest. Communications may be sent in French or German, and will be translated into English for publication.

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EDITED BY

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ALBERT J: COOK, *Lansing, Mich.;* CLIFFORD CHASE EATON,
Cambridge, Mass.

Vol. 3. No. 70.
FEBRUARY 1880.

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CAMBRIDGE, MASS., U. S. A.: PUBLISHED BY GEORGE DIMMOCK.

YEARLY SUBSCRIPTIONS, $1. MONTHLY NUMEROS, 15 c.

[Entered as second class mail matter.]

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S. H. SCUDDER,
Cambridge, Mass.

ACKNOWLEDGMENTS.

The Cambridge Entomological Club gratefully acknowledges the receipt of the following contributions to the permanent publication fund.

Previously acknowledged, . .	$167.75
From G: H: Horn, Philadelphia, Pa.	5.30
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EXPERIMENTS UPON THE EFFECT OF COLD APPLIED TO CHRYSALIDS OF BUTTERFLIES.

BY WILLIAM HENRY EDWARDS, COALBURGH, W. VA.

(*Continued from p.* 6.)

With every experiment, however similar the conditions seem to be, and are intended to be, there is a difference in results, and at present the reason therefor does not appear. For example, in 1878, the first butterfly emerged on 14th day after removal from the ice, the period being exactly what it is at its longest in this species in nature, with an occasional exception. Others emerged at 19 days and several at intervals up to the 96th day after ice. In 1879, the emergence began at 8 days, and by 12 days all which came out this year had appeared, except three belated individuals at 22, 40 and 50 days. In previous experiments, no matter what the species, the butterflies had not emerged till after the natural period of the chrysalis had passed, after removal from the ice. In this one, either the cold had not fully suspended the changes which the pupa undergoes in the chrysalis, or these changes were hastened by some other cause after the chrysalids were taken from the ice. In the first experiment, apparently, the changes were absolutely suspended as long as the cold remained.

It might be supposed that the application of heat to the overwintering chrysalids would precipitate the appearance of the summer form of *P. ajax*, or change the butterflies so that while they had the shape of *telamonides* they should have the coloration of *marcellus*. But I have not found this to occur. I have been in the habit, for several years, of placing the chrysalids in a warm room or in the greenhouse, early in the winter, so causing the butterflies to emerge in February, instead of in March and April, as they would otherwise do. But the winter form has invariably emerged from such chrysalids.

3. In June 1879, I obtained eggs of *Grapta interrogationis*, laid by form *umbrosa*, in confinement. As the chrysalids formed, and at intervals of from 6 to 24 hours after pupation, they were placed in the ice box. After 14 days I removed all but five, which were left 6 days longer. Several were dead at the end of the 14 days. Temperature most of the time about 35° F. [1°.7 C.], but a little higher for a few hours each day, as the ice melted, reaching then 40° to 45° F. [4° to 7° C.]. I obtained from the 14-day lot seven perfect butterflies, 3 ♂ 4 ♀; from the 20-day lot five, 4 ♂ 1 ♀; every one *umbrosa;* and nearly all had changed in one striking particular. In the normal *umbrosa*, of both sexes, the fore wings on upper side have, on costal margin next inside the broad border of hind margin, and separated from it by a considerable space of fulvous, a dark patch which ends a little below the discoidal nervule; inside the same border at inner angle is a similar patch lying on the submedian interspace. Between these two patches, across all the median interspaces, the ground is fulvous, but very slightly and faintly clouded with black. Indeed, this clouding would usually not be noticed.

I find that in all the four ♀ exposed to cold 14 days, there is present a *broad biack band crossing the entire wing*, continuous, of uniform shade, covering the two patches and intervening space, and almost confluent with the marginal border from end to end, only a streak of obscured fulvous anywhere separating band and border. In the other female, being from chrysalis exposed 20 days, the band is present, but while broad and covering the space between the patches, it is not so dark as in the other examples, and includes against the border a series of obscured fulvous lunules. This is like some normal females, and this female, though longest exposed, therefore is essentially unchanged.

In all the males, the patches are diffuse, those at apex almost coalescing with the border. In the three males from the 14-day lot, these patches are connected by a narrow dark band (very different from the broad band of the females), which occupies the same position as the clouding in the normal male, but blackened and somewhat diffused. In the four examples from the 20-day lot, this connecting band is scarcely as deep colored and continuous as in the other three. Beyond this change on the submarginal area, whereby a conspicuous band is created where naturally would be only the two patches and a faint cloudiness over the intervening fulvous space, I see no difference between these examples of both sexes and a long series of natural ones placed beside them, so far as relates to the upper surface.

On the under side, all the males are of the same type, the colors intense. There is considerably more red, both dark and pale, over the whole surface than in the series of natural examples; these latter discovering shades of brown, over which is a bluish or lilaceous flush. In the females I discover no change on under side.

It appears that 14 days was as effective in producing changes in case of this *Grapta*, as a longer period. In fact, the most decided changes were found to be in the females exposed least. It appears also that cold will produce change if applied after the chrysalis has hardened. In 1878, I put *Grapta* chrysalids on ice at from 10 minutes to 6 hours after pupation, and while some were quite soft, — and lost every one of them, although some chrysalids of *P. ajax* in same box, and in part exposed very shortly after pupation, were not injured. It also appears that cold may change certain markings only, and that the females were most susceptible to the influence.

The resulting butterflies were all *um-*

brosa, though both forms of the species might have been expected to appear. In breeding from eggs laid by *umbrosa* in a former year, I obtained both forms of the butterfly, viz.: 11 *umbrosa* and 6 *fabricii.* But from this single experiment it cannot be determined whether any change of form was brought about.

4. In 1877, a lot of eight chrysalids of *P. ajax*, all under 12 hours from pupation, were put on ice and left there 24 days. (They were placed on top of the ice, but in all later experiments I have placed them under it, in the bottom of the box.) The temperature was irregular, and as I was absent from home nearly all of the time, and had to leave the box in charge of servants, I felt no certainty that the ice had not been supplied irregularly, or that there had not been intervals during which there was no ice in the box. But from these chrysalids there came 5 ♂ 3 ♀ butterflies. Of these, one was *telamonides* unquestionably, in color and markings; all the rest were between *telamonides* and *marcellus*. Two other chrysalids, on ice 23 days, in the box at same time with the above mentioned eight, gave *telamonides*. But three more, exposed 26 days, and 1 hour from pupation when placed in the box, all gave unchanged *marcellus*.

In the box at same time were 6 chrysalids of *G. interrogationis*, and all of them gave unchanged *umbrosa*.

5. During the same season, 1877, I exposed six *P. ajax* chrysalids, keeping the temperature as nearly as possible at 33° F. [0.6° C.]. One was 1 hour from pupation, and remained in the box 5 days; one same age, remained in box 2¾ days; three at 3 hours old, for 8 days, and one, age omitted, for 6 days. All these produced *marcellus*, and therefore they had not been affected by the cold.

6. In 1877, I had placed several chrysalids of *Lycaena pseudargiolus* in the ice box, thinking that I might thus obtain the form *violacea*, which is the winter form of the species. On 8 Aug., 31 days after the chrysalids were removed from the box, a female emerged, in some respects considerably unlike either of the forms. The common series of dark streaks and points across the disks was wholly wanting, though the stripes across the ends of cells were present; and the marginal crescents were large and black — far more conspicuous than is ever seen in the natural *pseudargiolus*, and still very unlike *violacea*. The general coloration of both surfaces was that of the usual female *pseudargiolus*. All the other chrysalids were found to be dead.

In Can. Entom., v. 7, p. 236–240, I gave an account of the first experiments made by me in exposing chrysalids to cold, the subject being *P. ajax*. The chrysalids were placed in the ice box, but were subsequently removed to the ice house and left for two months after forming, but on returning home after a long absence I found the ice had wholly melted. The chrysalids had at first been subjected to a low temperature in the box, but as the ice in the house failed, the temperature had risen so that when I examined the tin cases which had held the chrysalids, many butterflies were found alive therein in a crippled state. About one half the butterflies that emerged from this lot were completely changed, being *telamonides* and *walshii*, and about half the rest were partly changed. It was observed also that the butterflies were generally smaller than the average *marcellus*. I have not been able to subject chrysalids to cold for a very long period, for the reason that ice fails us in midsummer, it having been put up when thin and of poor quality, owing to our moderate winter climate. Indeed, in some seasons we get no ice at all, as the streams do not freeze over. On more than one occasion the period of exposure has abruptly terminated, and much earlier than I had intended, by the failure of the ice.

SUMMARY OF THE EXPERIMENTS WITH *P. ajax*.

In 1877: chrysalids 1 to 3 hours old exposed from $2\frac{3}{4}$ to 8 days. Temperature 33° + F. [0.6° C.]. No change effected.

In 1878: chrysalids 10 to 15 minutes old, and at intervals up to 1 day, and then daily to 8th day from pupation; exposure from 19 to 5 days. Result: one *telamonides* or *walshii* from chrysalis 12 hours old, 11 days exposure; one *walshii* from chrysalis 2 hours old, 11 days exposure; one *telamonides* from chrysalis 3 days old, 16 days exposure; all the rest unchanged, but the periods of emergence remarkably prolonged. Temperature 33° + F. [0.6° C.].

In 1879: chrysalids not less than 12 hours old nor over 24 hours; exposed 14, 20, and 24 days. Result: the period of emerging greatly precipitated in nearly all cases. From the 14-day lot there was no change or only a partial one; from the 20-day lot, one half were changed, the rest partly or not at all; from the 25-day lot all were changed. Temperature 33° + F. [0°.6 C.].

In 1877: chrysalids under 12 hours old, but the minimum not noted; exposure 24 days. Temperature 40° F. [4.4° C.] and upwards, irregular. Result: one changed fully, seven partly; some others subjected to same conditions for 23 days were fully changed; others at 26 days not at all.

In 1875: chrysalids stated in my note book to have been exposed "as formed," but the exact age not given; exposed for 30 to 60 days; temperature at first about 32° F. [0° C.], afterwards uncertain. Result: 50 per cent. fully changed, 25 per cent. partly, rest not.

GENERAL CONCLUSIONS: —

1. *P. ajax*. The longer the exposure under a low temperature the more decided the change, but 25 or 30 days seem quite sufficient in many cases, and changes have been produced by exposure for 20, 16 and 11 days; no changes recorded at less than 11 days; while exposure at 8 days and less has produced no effect except in some cases to prolong the chrysalis period.

2. The longest interval between pupation and exposure to cold when any change has resulted, has been 3 days. In all instances beyond that no change has been produced. The shortest interval has been two hours, and in this instance the butterfly was changed to *walshii*, which is a change more extreme than to *telamonides*. Most chrysalids exposed so early die in the process, but as many changes have been effected when the age of the chrysalis at exposure has been from 12 to 24 hours, I believe that to be the most satisfactory period. The chrysalis has then become hard-

ened, and the growth of the organs of the pupa probably then begins, and their direction may best be turned by the cold then applied.

3. The effect of the cold is to albinize the butterfly, the black area being constantly reduced.

4. Cold has failed to change the shape of the wings, its influence being confined to coloration and markings; the frontal hairs of the head have also been changed; and the sexes are equally susceptible.

5. *Grapta interrogationis.* 14 days exposure after the chrysalids have hardened, has been found sufficient to produce changes; and the females were most susceptible to the influence of cold.

6. With different species the degree of temperature required to produce the most decided change varies. I have succeeded best with *Phyciodes tharos*, at 40° F. [4.4° C.]. At 32° F. [0° C.] have destroyed many *Grapta* chrysalids, but this may have been principally because the chrysalis was too tender when exposed. With *P. ajax* 32° to 40° F. [0° to 4.4° C.] seems a proper temperature.

My experiments with *Ph. tharos* are given in Can. Entom., v. 9, p. 4, and p. 204–206. Also in Butterflies of N. A., v. 2, pt. 7. In the former, a complete change was brought about, and every butterfly emerged in the winter form. Temperature about 40° F. [4.4° C.], and continued for 7 days, the chrysalids being 3, 6, 9 hours old when exposed, and before several had hardened. In the second experiment, the temperature was about 32° F. [0° C.]; the chrysalids were 10 minutes to 9 hours old, and the exposure was about 20 days. It was found that the butterflies emerging from chrysalids which had been from 1 to 9 hours old were completely changed; some which had been from 30 to 60 minutes old were not changed, while others of same lot were greatly suffused. I concluded that with this species it was not necessary that cold should be applied after the chrysalids had hardened, in order to change the form.

REVIEWS.

Professor Eduard Brandt's interesting papers upon the nervous system of insects, which appeared during 1878 and 1879 [see Rec., nos. 1451–1458] in the *Horae Societatis Entomologicae Rossicae*, are valuable additions to the literature of the subject. The amount of research upon which the author's conclusions are based, can be best understood, perhaps, by considering that Professor Brandt examined the nervous system of nearly a thousand species of adult insects, and of about one hundred and twenty-five species of larvae, and that he studied the metamorphoses of the nervous system in more than fifty species. Up to the time of appearance of Professor Brandt's papers but little had been published upon this subject; for example, the metamorphoses of the nervous system had been traced in only eight species (four lepidoptera and four coleoptera). Many important facts were ascertained in his studies, and the papers, published both in German and in Russian, and fully illustrated with photolithographic plates, present the facts in a systematic and carefully condensed form. *G. D.*

PSYCHE.

CAMBRIDGE, MASS., FEBRUARY 1880.

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PROCEEDINGS OF SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.

3 DEC. 1879. — . . . Mr. W. L. Distant exhibited a hitherto unrecorded variety of *Danais plexippus* (commonly known as *D. archippus*), received from Antigua. . . . Mr. C. O. Waterhouse communicated some interesting details as to tenacity of life in *Curculio cleonus*. — The Rev. H. S. Gorham read a paper entitled "Materials for a revision of the *Lampyridae*." — Mr. Bates, in connexion with the light-emitting power of this family, remarked that certain species of longicorns mimicked *Lampyridae* with great exactness, the light-giving segments of the latter being perfectly represented in the longicorns, although destitute of phosphorescent power. — Mr. J. W. Slater communicated a paper "On certain minute characters of insects with reference to the theory of evolution." — Extracted from *Athenaeum*, 27 Dec. 1879, p. 853.

CAMBRIDGE ENTOMOLOGICAL CLUB.

9 JAN. 1880. — 64th meeting. The officers for the year 1880 were elected, as follows: E: Burgess, *President;* B: Pickman Mann, *Secretary*, *Treasurer*, and *Editor of* PSYCHE; E: Payson Austin, S: Henshaw, Dr. E: Laurens Mark, *Executive Committee.*

Retiring president E: Burgess delivered the annual address, upon the progress made in anatomical and physiological entomology in recent years. [The address will be published in PSYCHE.]

Retiring secretary B: Pickman Mann presented his annual report, including the annual report of the treasurer, and of acting librarian Clifford Chase Eaton. This is the sixth annual meeting, and the third annual meeting as a corporation. The Club has 16 resident and 56 non-resident members. During the past year it has held 9 meetings, and has received 22 principal communications. 64 pages of PSYCHE, with 7 advertiser covers, were issued in 1879, also 26 extra pages of entomological items and advertisements, and 26 pages of the bibliography of the entomological writings of Dr. G: H: Horn and the writings of S: Hubbard Scudder. 32 more pages, besides the indexes, are required to complete the second volume of PSYCHE. Measures have been taken to ensure the continued publication of PSYCHE through a third volume.

The permanent publication fund amounts to $167.75.

262 new titles have been recorded in the library accession book since the last report, making 729 in all. A card catalog is being formed, and now numbers 203 cards. The arrangement of the volumes in the library is nearly completed.

B: PICKMAN MANN, *Secretary.*

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [ ], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor.

A colon after initial designates the most common given name, as: A: Augustus; B: Benjamin; C: Charles; D: David; E: Edward; F: Frederic; G: George; H: Henry; I: Isaac; J: John; K: Karl; L: Louis; M: Mark; N: Nicholas; O: Otto; P: Peter; R: Richard; S: Samuel; T: Thomas; W: William. The initials at the end of each record, or note, are those of the recorder, and will be explained at the end of each volume. Unless otherwise stated each record is made directly from the work that is noticed.

When there are not sufficient titles of current papers to fill the space allotted to the Record, earlier entomological publications will be recorded. In this way it is expected to include, finally, in the Record, all titles of papers not included in Hagen's Bibliotheca entomologica, which treat of North American or general entomology, and all papers on entomology published in North America.

Corrections of errors and notices of omissions are solicited.

Association française pour l'avancement des sciences — *Congrès de Montpellier, Section de zoologie.* [Abstract of proceedings, by Adrien Dollfus.] (Feuille des jeunes naturalistes, 1 Dec. 1879, p. 17–21.)

Jules Lichtenstein (p. 19–20) on some of the peculiarities of the reproduction of the *aphidae.* *G: D.* (1488)

Barber, S. Habits of animals in relation to the weather. (Monthly journ. sci., Nov. 1879, s. 3, v. 1, p. 728–731, 1 fig.)

Figures a spider's web spun between four lighted candles; other notes on habits of species of *araneae.* *G: D.* (1489)

Bee ranching in California. (Springfield [Mass.] d. republican, 5 Sept. 1879, p. 2, col. 6, 12 cm.)

From *Sunday afternoon.* *G: D.* (1490)

Brunner von Wattenwyl, Carl. Monographie der Phaneropteriden. Herausgegeben von der k. k. zoologisch-botanischen Gesellschaft in Wien. Mit 8 Tafeln. Wien, 1878. t.-p. + 401 p., 22.5 × 14, t 16 × 10.5; 8 pl., 27 × 22.5, t 24.5 × 18.

405 species divided into 115 genera and 39 groups, all except groups described in Latin. 49 of the genera are represented by a single species each. 62 of the species, belonging to 23 genera, are North American, but only 17 species (7 new) belonging to 5 genera (*dichopetala* = 1 new) are recorded north of Mexico; of these 5 genera, 2, with 5 + 3 species, are peculiar to the U. S., one only of the species occurring also in Mexico. Each genus (except *oxyprora* n. g.) is represented on the plate by a single species. The nomenclature of the neuration is discussed in the introduction, and the work is preceded by a division of the Locustarians into 14 tribes, and a table to find the genera described in the work, also in Latin. *S: H. S.* (1491)

Cook, Albert J: Bees improved by breeding. (Amer. bee journ., 1879, v. 15, p. 34.)

The same principles apply to the breeding of bees that are practiced in improving our higher animals. *A. J: C.* (1492)

Failla-Tedaldi, L. Note sur une invasion de la *vanessa cardui* L. observée en Sicile. (Feuille des jeunes naturalistes, March 1879, p. 64–65.)

Observations on swarming. *G: D.* (1493)

K., J. D. Vol de libellules. (Feuille des jeunes naturalistes, Nov. 1879, p. 15.)

Records great flight of dragon-flies near Havre, France, 7 Oct. 1879. *G: D.* (1494)

Northern range of *cermatia forceps.* (Amer. nat., Nov. 1879, v. 13, p. 711.)

C. forceps taken in Mass. and N. H. *G: D.* (1495)

Saunders, W: *Papilio cresphontes.* (Can. entom., Dec. 1879, v. 11, p. 240.)

Occurrence of *p. cresphontes* at Hamilton, Ont., and at Thedford, Ont., feeding on *dictamnus fraxinella* and *zanthoxylum americanum.* *B: P. M.* (1496)

Siewers, C: Godfrey. The brushes of the white-marked tussock moth, *orgyia leucostigma,* Smith & Abbot. (Valley naturalist, 1878, v. 1, p. 9.)

These brushes are used to cleanse the "beauty spots" on the hinder segments. *B: P. M.* (1497)

Southern Illinois normal university, *Carbondale, Ill.* 5th annual report of the principal [Robert Allyn] to the board of trustees. Carbondale, Ill., 1879. 44 p., 21 × 13.

Contains (p. 25–42), "Report of the curator of the museum," by G: Hazen French. *B: P. M.* (1498)

Turner, H: Stratagem of a wasp. (Amer. nat., Nov. 1879, v. 13, p. 710.)

A wasp leads up a tree by one of the antennae, a roach, probably previously stung. *G: D.* (1499)

Weiss, J: Crickets. (Atlantic monthly, Oct. 1877, v. 40, p. 467–468.)

In verse. *G: D.* (1500)

NECROLOGY FOR 1879.

Brandt, Johann Friedrich. [Biog. notices.] (Zool. Anzeiger, jahrg. 2, 8 Sept. 1879, p. 480; 20 Oct. 1879, p. 529.) (Botanische Zeitung, 14 Nov. 1879, jahrg. 37, p. 743.)

Dr. Brandt was b. 25 May 1802, in Jüterbogk, Prussia, and d. 15 July 1879, at Merekull near Narva, Russia. He was Prof. of Zool. at St. Petersburg, Russia, from 1834 until his death. *G: D.* (1501)

Chapman, T: [Biog. notice.] (Zool. Anzeiger, 17 Nov. 1879, jahrg. 2, p. 600.)

B. 22 Jan. 1816 in Nottingham, England; d. 27 Aug. 1879, in Burghill, Hereford, England. Spent much of life in Glasgow, where he studied the entomological fauna of Scotland. *G: D.* (1502)

Chapuis, Félicien. [Biog. notices.] (Naturae novitates, Oct. 1879, no. 20, p. 199.) (Zool. Anzeiger, 17 Nov. 1879, jahrg. 2, p. 600.)

[Biog. sketch by Dr. E. Candèze.] (Comptes rendus soc. entom. Belge, 4 Oct. 1879, s. 2, no. 69, p. 1–4.)

Dr. Chapuis, coleopterist, was b. in 1824, in Verviers, Belgium, where he afterwards practiced medicine. He d. in Heusy near Verviers, 30 Sept. 1879. *G: D.* (1503)

Chavannes, Auguste. [Biog. notice.] (Zool. Anzeiger, 6 Oct. 1879, jahrg. 2, p. 528.)

Dr. Chavannes, Prof. honor. de l'Academie de Lausanne, an entomological writer, d. 16 Sept. 1879, at Lausanne, Switzerland. *G: D.* (1504)

Chenu, Jean Charles. [Biog. note.] (Bost. d. advert., 17 Nov. 1879, no. 22223, v. 134, no. 73, 2 cm.)

Dr. Chenu was b. in 1808, in Metz, France; d. Nov. 1879. ". . . From 1850 to 1861 he was engaged with others in publishing an 'Encyclopédie d'histoire naturelle,' a work which made thirty-one volumes."—*Bost. d. advert.* *B: P. M.* (1505)

Fedrizzi, Giacinto. [Biog. note.] (Naturae novitates, Feb. 1879, no. 3, p. 47.)

Dr. Fedrizzi, an entomological writer, d. in Padua, Italy, in 1879. *G: D.* (1506)

Fitch, Asa. [Biog. notices.] (Amer. nat., Dec. 1879, v. 13, p. 798.)

[Biog. sketch by E. P. Thurston, entitled "Sketch of Dr. Asa Fitch."] (Pop. sci. mo., Nov. 1879, v. 16, p. 116–120, por.)

Dr. Fitch was b. at Salem, Washington Co., N. Y., 24 Feb. 1809, and d. there 8 Apr. 1879. In 1826 he went to the Renssalaer School at Troy, N. Y.; in 1829 was graduated from the Rutgers Medical College in New York city; in 1854 was appointed N. Y. State Entomologist, and held the latter position for 17 years. *E: B.* (1507)

Gastaldi, Bartolomeo. [Biog. notices.] (Naturae novitates, Feb. 1879, no. 4, p. 57.) (Zool. Anzeiger, 21 April 1879, jahrg. 2, p. 216.)

Dr. Gastaldi, Prof. Geol. and Palaeont., Director of the Museo Civico, in Turin, Italy, was b. 10 Feb. 1818, in Turin; d. 5 Feb. 1879, in Turin. *G: D.* (1508)

Gervais, Paul. [Biog. notices.] (Naturae novitates, March 1879, no. 5, p. 67.) (Zool. Anzeiger, 10 March 1879, jahrg. 2, p. 144.) (Amer. nat., April 1879, v. 13, p. 275–276.)

M. Gervais, Prof. of Comparative Anatomy at the Musée d'histoire naturelle, was b. 26 Sept. 1816, in Paris; d. 10 Feb. 1879, in Paris. *G: D.* (1509)

Loew, Hermann. [Biog. notices.] (Zool. Anzeiger, 23 June 1879, jahrg. 2, p. 336.) (Amer. nat., Dec. 1879, v. 13, p. 798.)

Dr. Loew, the dipterist, was b. 7 July 1807, in Weissenfels, Prussia; d. 21 April 1879, in Halle on the Saale, Prussia. *G: D.* (1510)

Moncreiffe, T: [Biog. notices.] (Naturae novitates, Aug. 1879, no. 17, p. 174.) (Zool. Anzeiger, 8 Sept. 1879, jahrg. 2, p. 480.)

[Biog. sketch by F. Buchanan White, entitled, "In memoriam Sir Thomas Moncreiffe, Bart."] (Scottish naturalist, Oct. 1879, p. 145–148, por.)

Sir T: Moncreiffe, of Moncreiffe, Scotland, President of the Perthshire Society of Natural History, and of the Cryptogamic Society of Scotland, a lepidopterist, d. 16 Aug. 1879. *G: D.* (1511)

Moquerys, S. [Biog. note.] (Naturae novitates, April 1879, no. 7–8, p. 92.)

M. Moquerys, coleopterist, d. 12 Feb. 1879, at Rouen, France, aged 87. *G: D.* (1512)

Pictet, Édouard. [Biog. notices.] (Nature, 22 May 1879, v. 20, p. 88, 6 cm.) (Naturae novitates, June 1879, no. 12, p. 135.)

Neuropterist; d. in 1879, in Geneva, aged 44. *G: D.* (1513)

Reichenbach, Heinrich Gottlieb Ludwig. [Biog. notices.] (Naturae novitates, April 1879, no. 7–8, p, 92.) (Zool. Anzeiger, 7 April 1879, jahrg. 2, p. 192.)

[Notice, by Friedrich, entitled "Necrolog H. G. L. Reichenbachs."] (Sitzungsber. d. natur. Gesellsch. Isis zu Dresden, Jan.–June 1879, p. 97–104.)

Dr. Reichenbach, Prof. of Natural History at Dresden, was b. in 1793 in Leipzig; d. 17 March 1879, in Dresden, Saxony. *G: D.* (1514)

Rondani, Camillo. [Biog. notices.] (Naturae novitates, Oct. 1879, no. 21, p. 207.) (Zool. Anzeiger, 17 Nov. 1879, jahrg. 2, p. 600.)

Prof. Rondani, dipterist, d. 18 Sept. 1879, in Parma, Italy, aged 72. *G: D.* (1515)

Saunders, W: Wilson. [Biog. notices.] (Naturae novitates, Sept. 1879, no. 19, p. 190.) (Botanische Zeitung, 14 Nov. 1879, jahrg. 37, p. 743.) (Amer. nat., Dec. 1879, v. 13, p. 798.)

Botanist and entomologist, b. in Little London, near Wendover, Buckinghamshire, England, 4 June 1809; d. at Raystead, Worthing, 13 Sept. 1879. *G: D.* (1516)

Smith, F: [Biog. notices.] (Psyche advertiser, March 1879, p. 7.) (Zool. Anzeiger, 24 March 1879, jahrg. 2, p. 168.) (Naturae novitates, March 1879, no. 6, p. 81.) (Can. entom. April 1879, v. 11, p. 78.) (Naturalist [Yorkshire], April 1879, p. 138.) (Entom. m. mag., April 1879, v. 15, p. 263–264.)

[Biographical notice, by J. W. Dunning.] (Entomologist, April 1879, v. 12, p. 89–92.)

Mr. Smith, Assistant Keeper Zool. Dept. British Museum, hymenopterist, b. in 1805, in London; d. 16 Feb. 1879, in London. *G: D.* (1517)

White, Adam. [Biog. notices.] (Zool. Anzeiger, 17 Feb. 1879, jahrg. 2, p. 96.) (Psyche advertiser, March 1879, p. 7.)

Mr. White was b. 29 April 1817, in Edinburg, Scotland; d. 4 Jan. 1879, in Glasgow, Scotland. He was in the Entom. Dept. British Museum from 1835 to 1863. *G: D.* (1518)

ENTOMOLOGICAL ITEMS.

The library of the Swiss Entomological Society has been removed from Schaffhausen to No. 195 à, rue des gentilshommes, Berne.

The entomological library of the late Professor Loew has been put on sale by List and Franke of Leipzig. It contains many rare papers upon diptera.

Mr. Van der Wulp, Secretary of the Dutch Entomological Society, has recently been appointed to the rank of Referendarius to the State board of control.

The last numero of the *Harvard Library Bulletin* published an account of the Entomological Libraries of the United States, by S: H. Scudder. The next will contain the first instalment of a Bibliography of Fossil Insects, by the same author.

Whatever is sent to the editors of Psyche or to the Cambridge Entomological Club, as a gift or otherwise, should be so addressed, and should be sent to Cambridge, Mass., U. S. A.; whatever is sent to the editors, for their private possession, should be distinctly addressed to them individually.

Mr. W: S. Barnard, Instructor in Entomology at Cornell University, Ithaca, N. Y., informs us that the report, in the *N. Y. Times*, that his paper, read at the Saratoga meeting of the A. A. A. S., on the Bud-blight insect, stated that *Psylla pyri* had not been described in this country, is not correct, and that the mistake was made by the reporter.

M. Paul Noel calls attention in the December numero of the *Feuille des jeunes naturalistes*, to a new mode of collecting nocturnal lepidoptera. He employs a lantern, hung about a metre and a half above the ground, as a permanent attraction, and then burns, from time to time, a small piece of magnesium tape, to attract specimens from a greater distance to a point where they can see and come to the less brilliant light. According to M. Noel, a half-metre of tape suffices for the evening, costs but little, and gives remarkably good results.

SOCIETY MEETINGS.

The regular meetings of the Cambridge Entomological Club will be held at 19 Follen St., at 7.45 p. m., on the days following: —

9 Jan. 1880.
13 Feb. „
12 Mar. „
9 April 1880.
14 May „
11 June „

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following: —

28 Jan. 1880.
25 Feb. „
24 Mar. „
28 Apr. 1880.
26 May „

B: Pickman Mann, *Secretary.*

The annual meetings of the Entomological Section of the American Association for the Advancement of Science will begin at 2 p. m., on Tuesday, 24 Aug. 1880, at a place yet to be determined, in Boston, Mass. Members who intend to present communications that may provoke discussion are requested to allow the Secretary to announce their subjects, in order that other members may come ready to enter into a thorough discussion.

B: Pickman Mann, *Secretary,*
Cambridge, Mass.

The regular meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following: —

9 Jan. 1880.
13 Feb. „
12 Mar. „
9 Apr. 1880.
14 May „
11 June „

James H. Ridings,
Recorder.

The semi-annual meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following: —

8 Dec. 1879.
14 June 1880.

James H. Ridings,
Recording Secretary.

ADVERTISEMENTS should reach the editors by the 10th of the month preceding the one in which they are to appear.

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VI. Jahrg. 1880.

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Baron v. Harold, Entomological Museum of Berlin, says of this magazine:—

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No. 69 was issued 22 Jan. 1880.

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ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

[Established in 1874.]

EDITED BY

GEORGE DIMMOCK, *Cambridge, Mass.;* B: PICKMAN MANN, *Cambridge, Mass.;*
ALBERT J: COOK, *Lansing, Mich.;* CLIFFORD CHASE EATON,
Cambridge, Mass.

Vol. 3. No. 71.
MARCH 1880.

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CAMBRIDGE, MASS., U. S. A.: PUBLISHED BY GEORGE DIMMOCK.

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PSYCHE.

RECENT STUDIES IN INSECT ANATOMY.

THIRD ANNUAL ADDRESS OF THE PRESIDENT.

In the annual address expected from the chair of the Cambridge Entomological club, your first President discussed the then recent contributions to our knowledge of the life-history of insects, and last year some of the phenomena of their geographical distribution were brought to your notice; a third side of entomological study fortunately remauns for me, and so — simply as a recorder, not as a critic — I will endeavor to lay before you tonight a brief review of the works relating to insect anatomy and physiology which have been published during the past two years. As this could not have been attempted, without the aid of Prof. Carus' Zoologischer Anzeiger, let me join in the paean which grateful zoologists raise to the editor and publisher of this invaluable record of zoological progress.[1]

We find very few general works, as one may suppose, to be noticed. The concluding part of Dr. Graber's useful manual "Die Insecten," has just appeared. It contains the chapters on embryology and development, and as the first general sketch of the subject, its publication is certainly epoch-making. Mr. Emerton's "Structure and Habits of Spiders" contains much on the anatomy and development of these animals, and, with its numerous original figures, will be of great service to general students.

Mr. Maurice Girard[2] has published a work on bees, which I have not yet seen. And this is also the case with Dr. H. Grenacher's large work on the structure of the arthopod eye.[3]

The first annual report of the U. S. Entomological Commission contains a general sketch of the anatomy of *Caloptenus*, by Dr. Packard, the most important part of which is the description of the respiratory system, with its tracheae and air-sacs. There is also a section[4] on the histology of the digestive tract, by Dr. C. S. Minot. Previously unnoticed structures, in the shape of twelve longitudinal, forward projecting, folds on the border between the stomach and ileum, are described.

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[1] After much of this address was written, the record by Mr. Frank Crisp in the Monthly Journ. Royal Micros. Society came to my notice, and proved useful, as will be seen, in many cases.

[2] Les Abeilles, organs et functions, etc. Paris, Baillière, Dec. 1878. 288 p., 1 pl., 30 figs.

[3] Untersuch. u. d. Sehorgan der Arthropoden. Göttingen, 1879.

[4] See also Dr. Minot's article, Amer. Nat., (June 1878,) v. 12, p. 339.

Of the papers on the general anatomy of groups or species, is one of considerable length by Dr. Ernst Voges,[5] on the *Julidae*, the greater part being a description of species, particularly, however, in respect to the male genital armature. There is also a general description of the dermal skeleton, with its muscles, of the tracheal system, and of the scent glands; the section on the tracheal system being the most important. Voges regards the mouths of the tracheae in the "stigmatic pouches," as the morphological stigmata; the pouches themselves being simple infoldings of the derm, carrying the true stigmata within the body. The scent glands are retort-shaped bodies, the necks of which open, of course, into "foramina repugnatoria," and are provided with an automatic plug, the mouth being opened by the contraction of the muscle appended to each gland.

In a later note[6] Dr. Voges describes the tracheal system of Glomeris, which seems to approach that of the hexapods, as there is no stigmatic sac, but true stigmata which open externally, leading into short tubes (probably modified tracheal trunks), which bifurcate, their forks giving rise in turn to furcating tracheae. There is, however, no tracheal anastomosis. The stigmata are armed against the entrance of impurities by an edging of numerous thorn-like structures. It should be remembered that the tubes have points for the insertion special muscles, like the stigmatic sacs of *Julus*.

Mr. S. Sograff sums up his studies on certain Chilopods in a short note in Carus' Zool. Anzeiger (v. 2, p. 16). Among the points referred to may be mentioned the following: The tracheae resemble those of lepidopterous larvae, and are provided with a simple, though very peculiar stigmatic closing apparatus. The brain consists of fibres and of cells of two sorts, the smaller of which recall those of hexapods. The form of the brain depends on the number of eyes and length of body. The longer a chilopod is, the fewer eyes, and the smaller optic lobes, consequently. The latter are totally wanting in *Himantarium*. The structure of the eye closely approaches that of larval insects. The ovaries are much like those of spiders; the nearly ripe eggs are clothed with small, probably epithelial, cells. The receptaculum seminis shows a distinct muscular and epithelial wall. The testes are filled with large, quadrangular big-nucleated, mother cells, which probably arise from the epithelium of the thin, upper part. The walls of the sperm-reservoirs have an epithelial, and a delicate reticulate muscular, layer.

Glands are very numerous. The poison glands consist of a stout chitinous duct, whose walls are pierced with very many chitinous tubelets which end in pear-shaped glands. The whole glandular system is clothed with a muscular *rete*, as Leydig has already shown to be the case with the nervous system.

The poison glands of centipedes have been, however, previously described by Mr. Jules Macleod.[7] According to the latter writer, the glands lie in the terminal joint of the forceps, extending into the distal half of the basal joint. Each gland is in the shape of a long sac, in the middle of which runs a chitinous excretory tube strengthened by a spiral fibre, trachea-like. Minute perforated cylinders cover the outside of the tube, to which are attached the very long glandular cells, radiating out from the central tube. The gland is enveloped exteriorly by a *tunica propria*, which is inflected along one side and probably reaches, and is attached to, the central tube, thus making a long narrow furrow along the gland. The latter is remarkable for the want of tracheae. The central tube opens very obliquely on the upper surface of the forceps just behind the point, forming a minute, long-oval cleft.

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[5] Zeitschr. wiss. Zool. v. 31, p. 127.

[6] Carus' Zool. Anzeig., v. 1, p. 361.

[7] Bull. Acad. Roy. Belg., v. 44, no. 6.

Mr. J. A. Ryder's papers[8] on *Eurypauropus*, though not anatomical, deserve mention here as recording the discovery of new genus of Pauropods. *Eurypauropus* superficially differs from *Pauropus*, as does *Polydesmus* from *Julus*, that is, it is a flattened and obtected form. There are only six actual segments, instead of ten as in *Pauropus*, but like the latter nine pairs of legs. Eyes are wanting. Ryder wrongly (as he has since recognized) figures the legs as terminating with two claws, instead of one. The mouth parts, moreover, seem to me to project backwards instead of forward as represented by Ryder. The larvae are very odd, and apparently composed of only three segments. As in *Pauropus*, they are hexapod.

Any addition to our knowledge of that remarkable form *Peripatus*, which we must recognize as a tracheate arthropod, and which can hardly fail to throw important light on the whole group, is also to be gladly recorded. Mr. F. M. Balfour has just published a short note[9] on *Peripatus capensis*. Organs, apparently to be recognized as segmental, are found "at the bases of the feet in two lateral divisions of the body-cavity, shut off from the central median division by longitudinal septa of transverse muscles." These consist of: a dilated vesicle opening at the base of the feet; a coiled glandular tube connected with this and subdivided again into several minor divisions; a short terminal portion opening into the body cavity. These segmental organs approach more nearly those of the leech. There are besides two glandular bodies.

Balfour finds a suboesophageal ganglion, and distinct ventral ganglionic swellings for each pair of feet. In the nervous system there is, therefore, more resemblance to the normal articulate nerve chain than has been supposed to exist. There are traces also of a sympathetic system.

The organ doubtfully described by Moseley as a fat body, turns out to be a glandular tube, opening by a non-glandular duct into the mouth. This Balfour regards as homologous with the salivary glands, and thus of course we find another arthropodan affinity in *Peripatus*.

Mr. A. Croneberg gives an abstract[10] of a paper in the Russian language, on the structure of three genera of *Hydrachnida* (*Hydrachna*, *Eylais*, *Nesaea*). The mouth parts, the genital, and digestive organs are described. The latter consist of a large stomach with a variable number of cocca, — 5 in *Nesaea*, 11 in *Hydrachna*, 34 in Eylais. All these cocca communicate with each other, and are clothed with large, brown cells, numbers of which also occur in the stomach, and represent the liver. The excretory organs are reduced in *Hydrachna* to a single median sac, wider anteriorly. In *Nesaea* it divides into four short branches, but it is more complex in *Eylais*. The terminal portion in all tends downward and runs direct to the anus. There is no rectum, the stomach ending blindly, according to Croneberg. A sort of fat body is found about the digestive organs. There are three sets of oral glands in *Eylais* which open by a common duct into the mouth.

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[8] Proc. Acad. Nat. Sci. Phila., 1879, p. 139, 164. Amer. Nat., v. 13, p. 603.

[9] Quart. Journ. Micr. Sci., v. 19, p. 431; also Carus' Anzeig., v. 2, p. 332.

[10] Carus' Zool. Anz., v. 1, p. 315. Croneberg has also published a paper (Bull. Soc. Imp. Nat. Moscow, 1879, No. 2, 234), not yet come to hand, on the structure of *Trombidium*.

A paper [11] by the late Dr. Hermann Lebert, Die Spinnen der Schweiz, Bau und Leben, &c., I have not been able to see.

Dr. Batelli [12] has studied the anatomy of the larva of *Eristalis tenax*. The external tube of the long tail is regarded as a modified segment, which is shown by the presence of the lateral papillae, each with its long hair, as occurs in the other body segments. The retraction of the internal tube is by two muscles inserted at its superior extremity, where there are some gigantic cells with large nuclei, having in the interior, as a product of elaboration, a long twisted filament. Connected with the two tracheae are two air sacs almost the length of the body. The digestive apparatus has in its vestibule two chitinous plates. In the pharynx, besides the two jaws, are eight peculiar beards, consisting of two series of divaricated barbules. The salivary ducts are lined with a spiral thread, as is often the case. The chylific stomach is preceded by four ventricular glands, and there are four Malpighian tubes. The anal glands contain a great quantity of urates, and are composed of a straight part and another folded back. Besides the supra- and sub- oesophageal ganglia are two intermediate ones connected by means of a peduncle to the lateral commisure. The following ganglia are united.

Mr. Carl Gissler [13] has described the anatomy of the once rare *Amblychilacylindriformis*, and figures parts of the nervous, digestive, and reproductive systems. No new results are to be noted.

Turning now to special papers on the anatomy of particular organs or systems, we may first notice several on the dermal skeleton and its appendages.

Led by Darwin's difficulty in reconciling the great difference between the worker ants and the sexual individuals, Dr. H. Dewitz [14] has studied the development of the legs, and especially of the wings in *Formica rufa*. His results, together with some additional observations on the development of the wings in lepidoptera, are best summed up by using nearly his own language: "The ant-workers, like the males and females, possess in their young stages small, yet identically formed wing-buds ["imaginal discs"] which retrograde during further growth.

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[11] Neu Denkschr. d. allg. Schweiz. Ges. f. Naturw., v. 28. Also separate, by Friedländer und Sohn.

[12] Soc. Toscan. di Sci. Nat., Proc. Verb., Nov. 1878. Shortened from notice in Ann. Mag. Nat. Hist., 5, v. 3, p. 94.

[13] Psyche, v. 2, p. 233.

[14] Zeitschr. wiss. Zool. v. 30, Suppl., p. 78; supplementary note, *ibid*, v. 31, p. 25; also Sitzungsb. Ges. Nat., Berlin, 1878, 122.

"The thoracic appendages of ants make their first appearance in the young larva, as disc-shaped thickenings of the hypoderm, which divide into a core (leg or wing), and an envelope, with an external opening (covered, of course, by the chitin layer). The envelope grows into a sac or pocket-shaped fold within the body cavity; the core or bud into the respective leg or wing. During the transition to the pupal stage the sac is turned inside out, or rather the opening which existed from the first, becomes enlarged and the appendage is thrust forth.

"The developing leg or wing of the ant and bee casts its skin while yet in the larval stage; so that, in respect to undergoing a moult, there is not the least difference between the postembryonal formed appendages of insects with a perfect or imperfect metamorphosis (e. g., leg and wing of the ant, wing and ovipositor of the grasshopper); the difference being simply that in insects with perfect metamorphosis the new forming appendage lies generally hidden in infoldings of the hypoderm, making its first appearance outwardly during pupation; while in insects with imperfect metamorphosis, this occurs at the beginning.

"Likewise the formation of the lepidopterous wing, and, according to my view, of the appendages of all insects, starts from the hypoderm, although perhaps the entering tracheae, nerves, &c., effect the internal formation of the appendage.

"The great difference between ant workers and females is not brought about by different treatment of the larvae or eggs by the mature workers, but while yet in the maternal body the egg receives the imprint of its future destination."

Dewitz farther studied the mode of origin of the thoracic thorns in *Myrmica*, which grow directly out of the hypodermis, thus behaving very differently from the locomotive appendages. A section on the difficulty of accounting for the inheritance of worker characters, which Dewitz cannot help to clear up, concludes this interesting paper.

Dr. Dewitz also in a short note[15] records a case of malformation in which five joints of one of the hind legs protruded through the larval skin of an ant (*Atta insularis*) nearly ready to pupate. Dewitz does not, however, think that this is simply a case of incompleted moult, but believes that the leg from the first, instead of lying in the hypodermic infolded sack, grew outwards and, being unable to separate the hypoderm from the chitinous layer, pierced the latter before it became much hardened.

A paper by Mr. Antoine Simon, on the Hautskelet der arthrogastrischen Arachniden[16] I have not seen.

Schneider, in a paper[17] of nearly sixty pages in length, describes the different forms of scales found on the different parts of the body and wings of the lepidoptera. Two plates illustrate these forms, and a diagram of a lepidopter, showing the character of the scales on different parts in the *Rhopalocera* and *Heterocera*, is also given.

Mr. Joseph Beck[18] adds a little note to his studies on the scales of insects. In a species of *Mormo* he has found scales showing under a 1-5 "notes of exclamation" like Thysanouran scales, while with a 1-10 the real ribbed structure of the scale is evident. It is also stated that corrugations of lepidopterous scales are invariably found on the under side only. Just the opposite is maintained by Dr. H. Burmeister,[19] who also believes that there is no internal membrane. The striae are due to filaments elevated on the inner side of the upper membrane. In the large scales of Castnia they do not traverse the scale, but terminate free. The lower membrane has a different internal structure showing a great number of small irregular transverse lines.

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[15] Carus' Zool. Anz., v. 2, p. 135.

[16] Salzburg, Verf., 1878.

[17] Zeitschr. ges. Naturwiss., v. 51, p. 1.

[18] Journ. Roy. Micr. Soc., v. 2, p. 810.

Haller [20] figures and describes peculiar forms found in the terminal hair brushes of *Polyxenus*. These are transparent, hooked at the end, which has three or four slender clubbed processes directed backwards and lying in the same plane. The sides of the hair are barbed with forward directed points. These hairs are surrounded with shorter club shaped ones. There are also larger double comb-like hairs, the teeth of which point forwards.

Ignorant of Hick's long since published paper,[21] Haller [22] also describes briefly the sucking hairs on the tarsus of male water beetles (*Dytiscus*) ; nothing new is reported.

Dr. Ph. Bertkau has described [23] an interesting scent apparatus on the last pair of legs in the male of *Hepialus hecta*, L. In this moth the posterior tarsi are aborted, and the tibiae are large and club-shaped, their interior being filled with long glands which each open in a pore. A long hair covers each pore, and on the inside of the tibiae these hairs form a thick brush. The first abdominal segment, moreover, has beneath two pockets, formed by an infolding of delicate skin, the margins of which are also provided with long hairs. In rest the moth keeps the hinder tibiae in these pockets, the long hairs on both effectually preventing the escape of the ethereal oil secreted by the tibial glands, which has a pleasant aromatic odor. This of course recalls the scent apparatus on butterfly wings described by Fritz Müller, and must serve as an attraction to the opposite sex.

Mr. Brunner von Wattenwyl [24] has found a peculiar organ on the hind femora of the *Acrididae*. In the furrow on the under side, into which the tibia fits, about one fourth from the base, is a small wart-shaped elevation, open in the centre, where there is a soft pad, sometimes projecting like a blunt tubercle. The raised margin of the elevation is on the basal side beset with some delicate white hairs. The pad, which has a glandular appearance, is always white or gray. It is found only in the jumping tribes, but occurs both in chirping and dumb species. No suggestion as to its function is offered.

Messrs. Perez [25] and Jousset De Bellesme [26] discuss the nature of buzzing in insects. True buzzing is the sound emitted by rapid wing vibrations (exceeding 80). The hum of the hawk-moths is simply the friction of the wing against the air. Hymenoptera and diptera are the only true buzzing insects, and according to De Bellesme produce two sounds, a grave and a sharp. The latter is produced by the vibrations of the thorax. The thoracic stigmata may be closed without destroying the humming power, thus disproving Landois's theory.

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[19] Descr. Phys., Republ. Argentine, v. 5, p. 21. See notice Journ. Roy. Micr. Soc., v. 2, p. 866.

[20] Arch. f. Naturg., v. 44, p. 99.

[21] Linn. Trans., v. 22, p. 147, 383.

[22] Arch. Naturg., v. 44, p. 97.

[23] Katter's Ent. Nachr., No. 17, 223.

[24] Verhandl. Zool.-Bot. Ges. Wien.

[25] Comptes rend., v. 87.

[26] Ibid., p. 535.

Mr. Perez[27] in a supplementary communication does not agree with Mr. De Bellesme in thinking that a conical movement of the thorax (whatever that may be) can produce a sound, because on fixing the animal with a pin the movements are very attenuated, without the movements of the wings and the buzzing being destroyed, or even weakened.[28]

Mr. Carl Gissler describes[29] the repugnatorial glands of *Eleodes* as two reddish-brown, semi-bilobed pieces in the form of a Y, extending from the base of the last, to the middle of the second segment, a length of about 6.5 mm. He did not succeed in recognizing the nature of the secretion.

The balancers in the diptera have been studied by Messrs. J. De Bellesme[30] and Rob. Desvoidy,[31] but I have not been able to see the paper of either.

Dr. W. Breitenbach[32] describes the peculiar appendages on the proboscis of the lepidoptera, which he thinks enable the insect to pierce the tissues of flowers, &c., for honey or other juices. The orange-sucking moth, *Ophideres fullonica*, the structure of whose proboscis was first made known by Mr. Francis Darwin, is of course the typical example of this power in the lepidoptera, but Breitenbach shows that many other genera of butterflies and moths are armed, though less formidably, for similar purposes. These appendages are of course confined to the end of the proboscis, and are modifications of simple hair structures, such as are found on the basal portion, consisting of the hair itself and the annular basal ridge from which it grows. This ring becomes lengthened into a cylindrical body, still having the terminal hair, which, however, becomes much reduced — often to a simple papilla. The end of the cylinder is then armed with teeth, or its sides develop ribs or plates, or sometimes several rows of teeth. Indeed we find a large number of patterns connected by more or less numerous stages of development, and which Breitenbach believes may furnish useful systematic characters. Every step in the evolution of the simple hair to the perfected barb on the proboscis of Ophideres may be traced. The author seeks to reconcile the view that these structures are taste organs, by suggesting that this function may belong to the simple hairs, some of which, however, have been developed by natural selection into boring organs.[33]

Mr. Jules Künckel[34] has examined the termination of the nerves in the proboscis of diptera. The two terminal flaps of the proboscis represent the labial palpi. The trachea-like internal structures are not real tracheae, but simply supports of the flaps. Parallel to the large trunk of these false tracheae, is the labial nerve, which soon divides into two parts, and sends a multitude of ramifications to the periphery and inner surface of the flaps. The former terminate in the marginal, well developed, hairs; the latter in the rudimentary hairs of the inner surface, which are reduced to a minute chitinous cylinder. The nerve filament that goes to a hair ends in the base of the latter; but in the rudimentary hairs the filament traversing the cylinder projects beyond. These are probably gustatory, and the former tactile.

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[27] Rev. Internat. Soc., v. 3, (79), p. 281.

[28] Quoted from Journ. Roy. Micr. Soc., v. 2, p. 408.

[29] Psyche, v. 2, p. 209.

[30] Balanciers chez les Ins. dipt. 96 pp. Paris, Germar Bailliere & Cie.

[31] Bull. sci. Dépmt. du Nord, 2 s., v. 1, p. 217.

[32] Arch. Mikr. Anat., v. 15, p. 8, and Katter's Entom. Nachr., v. 5, p. 238.

[33] See also a note in Carus' Zool. Anzeig., v. 2, p. 427.

[34] Assoc. Franç. Avanc. Sci. (1878), 771. From notice in Journ. Roy. Micr. Soc., v. 2, p. 865.

Mr. V. T. Chambers[35] describes the structure of the tongue in some hymenoptera. In the *Apidae* he decides it is a sucking organ, but not in the *Andrenidae*. The honey in the former passes through a hollow colorless tube open at the apex, with a smallest diameter of 1-20th of a millimetre; but in the latter this tube is imperforate at the apex. Mr. J. D. Hyatt also discusses[36] the same subject, differing, however, from Mr. Chambers, in believing the colorless rod to be open along the median ventral line, and applied to the ventral, instead of dorsal, internal aspect of the tongue itself. Both writers are unfortunately unacquainted with the recent descriptions of Wollf and Graber.

Mr. Chatin compares[37] the labium in the orthoptera with the maxilla, and finds that the pieces of the latter have homologues in the former. *Locusta viridissima* is taken as an example.

I have myself attempted[38] to describe the structure of the head, and more particularly of the maxillae, in the *Psocidae*. The latter are remarkable for their fork-like appendage, the morphology of which is not clear. Supposed salivary receptacles are also described.

The most valuable paper relating to the digestive system is Dr. E. Schindler's monograph[39] on the Malpighian vessels. After the usual prefatory history of the conflicting views as to their function, Dr. Schindler describes these organs in detail in the orthoptera. Histologically, by the way, each tube shows (1) a serous membrane, (2) a delicate *tunica propria*, (3) the glandular epithelium, and sometimes (4) an *intima* with pores. The author could not find the vessels in *Thysanoura*; in *Lepisma*, however, he believes there are eight arising from the posterior end of the chylific stomach. In *Mantis* they are inserted at the end of the first third of the small intestine. The Malpighian tubes in the *Gryllidae*, as well known, are remarkable in the possession of a common excretory duct, which Dr. Schindler finds has a peculiar muscular envelope. The terminal appendages, imperfectly described by Sirodot, are shown to belong to the connective tissues, and have not in any way an excretory function. Heidenhain's sulphindigotate experiment was tried with *Gryllotalpa* and *Locusta* (by injections of course), and the Malpighian vessels were found to act just like the mammalian urinary tubules. The gradual passage of the sulphindigotate could be traced through the excretory cells. The yellow and white forms of tubes are regarded as identical in function, and moreover the former are probably only a younger stage of the white tubes.

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[35] Journ. Cincinnati Soc. Nat. Hist., v. 1, p. 40, 161.

[36] Amer. Quart. Micr. Journ., v. 1, p. 287.

[37] Comptes rend., v. 87.

[38] Proc. Bost. Soc. Nat. Hist., v. 19, p. 291; also Psyche, v. 2, No. 43.

[39] Zeitschr. wiss. Zoologie, v. 30, p. 587.

The pseudoneuroptera are very like the orthoptera in the Malpighian vessels, and contract into the genuine neuroptera, when the number of tubes is only six or eight.

Leaving the orthoptera, the other groups are then briefly treated.

Dr. Schindler doubts Dr. Mark's opinion that the vessels are ever solid in *Lecanium*, *Aspidiotus*, &c., as he has never failed to find a lumen in the case of every insect examined, although the genera in question do not appear to have been among the number.

The diptera are found to present several points of interest. The assertion that *Culex* and *Psychoda* have five Malpighian vessels is confirmed, and these genera are thus the only known exceptions among insects to the rule that the number of vessels is two or some multiple. A singular difference was found between *Eristalis tenax* and *E. florens*. The former shows the normal form of epithelial cells, while they are convex or even conical externally in the latter, giving the vessels a sort of gnarled surface, in the little hillocks of which the nucleus lies, drawing to it the granular contents of the cell, and leaving the inner portion pellucid. In *Sarcophaga carnaria* cells in different regions of a tube were seen multiplying by division and by proliferation.

In the fan-winged moths six vessels were found, as in other lepidoptera, contrary to Suckow's affirmation that they have only four. In a noctuid pupa all six vessels were found opening into a simple duct, — probably a malformation. Important observations on the sympathetic nerve supply of the Malpighian vessels was made in *Euprepia*, to which I can only refer.

Dr. Schindler declares confidently that his researches must forever settle all dispute about the function of the Malpighian vessels. They are certainly urinary organs.

The opposite view is, nevertheless, maintained by Dr. H. Simroth, in a paper on the digestive system of the larva of *Osmoderma eremita*,[40] who believes that, in this case at least, these vessels must be hepatic. First, because they open into the digestive tract on the same level with the posterior coecal appendages which exist in this larva, and the presence, moreover, of a gutter-like arrangement, which Simroth believes must lead their secretion even farther forward in the digestive tract. Second, he has not found urinary contents; finally, because digestion must take place posteriorly to their insertion. We have such conclusive evidence in many cases of the renal nature of the Malpighian vessels that it is hard to believe that we have a real exception here; and if we concede to such an exception, the absence of renal organs must still be explained. Simroth's arguments at least show the necessity of farther study of the action of the complicated parts in this insect, which Simroth carefully describes, but of which it would be hard to give an intelligible account here.

Mr. Felix Plateau continues his researches on the digestive organs, by a paper[41] on this system in the myriapods. The digestive tube shows three divisions: an oral, middle, and terminal. The first may be short and broad (*Julus*), or long and narrow (*Geophilus*). The epithelial layer is sometimes wanting, and the cuticle has sometimes projecting points. The terminal division is often short, but in some forms (*Glomeris*) becomes very long, and is coiled. There is a pair of salivary glands, and one or two pairs of Malpighian tubes; the latter open at the end of the mid-gut, and seem to be urinary organs.

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[40] Giebel's Zeitschr. ges. Naturwiss., v. 51, p. 493.

Dr. Forel[42] describes the gizzard in the different groups of ants, claiming its importance, and the importance of a general knowledge of internal as well as external anatomy, for natural classification. The gizzard in the ants is composed of three divisions, the second of which is a simple slender tube, the cylindrical protrusion of which into the interior of the stomach form the third division, which differs only in this position in the stomach from the second. The cuticular intima of these divisions turns on itself at the opening of the third, into the stomach, and thus covers it externally; but on reaching the gastric cells of the stomach it vanishes, leaving the stomach without any intima, — differing from the rest of the digestive tract in this respect. The middle or cylindrical division never varies in the different genera except as to length, but it disappears entirely in some groups. Anteriorly the cylindrical part expands suddenly into the anterior division — the true gizzard — which in contrast to the former, varies in the different groups. This division consists of two parts, a globular "bowl" and a cylindrical "calyx," the latter the anterior. In these the interior cuticle is thrown into four large longitudinal folds, so that the lumen is X-shaped in cross section. Between the "bowl" and the "calyx" there is a valvular apparatus of four pieces, corresponding to the fold. Four powerful longitudinal muscles lie in the fold. The structure of this anterior division, as seen from the description just given, is too complex to be understood properly without reference to the figures. The forms occuring in different genera are described, and their value for classification is pointed out.

Mr. V. Liénard has published[43] some "Recherches sur la structure de l'appareil digestif des Mygales et des Néphiles," which have not yet reached us. A note in Carus' Anzeiger states as a result, "There is no glandular organ attached to the cephalothoracic portion of the intestine; the branches of the latter ramify more and more as the size of the animal increases."

Mr. L. Joulin[44] shows graphically the changes in weight undergone by a lepidopter, from birth to death, by a curve, the ordinates of which represent the weight, and the abscissae the age, of an individual. The curve is seen to ascend with great rapidity, till the larva ceases to eat, then falls as suddenly till nearly half reduced, when it declines gently during the last pupal days, suddenly falling at exclusion, — the result of the lost weight of cast skin, &c. — from which time there is another gradual fall till death, varied of course in feeding imagos by slight rises and falls.

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[41] Mém. Acad. Roy. Sci. Belg., v. 42.

[42] Bull. Soc. Vaudoise des Sci. nat., v. 15, p. 337.

[43] Bull. Acad. Belg., v. 46, p. 698–706. There is also a "Rapport sur ce travail," Ibid., p. 586–7, by M. F. Plateau.

[44] Comptes rendus, v. 87, p. 334.

Prof. Engelmann communicates[45] some observations made by Van Lidth de Jeude, on the silk glands of the silk worm. Each gland beyond the common duct, consists of a very fine duct, a stout, little contorted, intermediate division (so-called reservoir), and a long much contorted final division; each part has a delicate *membrana propria*, and an epithelial layer. The inner surface of the duct and beginning of the next part have also a firm cuticle. Numerous fine tracheae penetrate the epithelium of the middle and end divisions, as do also accompanying on independent nerve fibres. The epithelial cells are diverse in the three portions; two cells only appear in a cross section (more in *Cossus*). The nature of the protoplasm of the cells of each division is further described at length. The silk-gum and the yellow coloring matter were found to be secreted by the middle division. The specific peculiarities of the silk are developed after the union of the two ducts. Silk spun under water was found not to differ from that spun in the air, thus precluding the idea that drying is necessary.

Concerning the nervous system may first be mentioned the papers of Dr. Edouard Brandt,[46] who has undertaken a most comprehensive series of studies on this subject, 1032 species of hymenoptera, coleoptera, hemiptera, lepidoptera, and diptera having been examined. The results show: 1. In some forms, as in *Stylops*, the suboesophageal ganglion fuses with the next posterior. 2. "Convolutions" of the brain occur in all; but (3) vary in different individuals of the same species, and are less developed in the males of the social hymenoptera than in the females and workers. 4. A connection between the development of the instincts and that of the brain hemispheres. 5. The labrum nerves arise from the oesophageal nerve-ring. 6. When two thoracic ganglia exist, the first corresponds to the first or the first two larval ganglia; the second to the one or two thoracic and one abdominal ganglia. 7. The number of ganglia may vary in the same species, e. g., bees and wasps. 8. The penultimate ganglion may be compound instead of the ultimate one. 9. *Bombus* and *Tenthredo* have a thoracic sympathetic system like that of the abdomen. 10. The resolution of one larval ganglion into a number in the adult may occur, as in *Volucella*. 11. In cases of a single ganglion in the thorax of hemiptera, this corresponds to the last two thoracic and all the abdominal ganglia. 12. Lepidoptera have four abdominal and either two or three thoracic ganglia.

Mr. N. M. Wagner[47] points out the supra-oesophageal ganglion as the seat of almost all the functions of the cerebral hemispheres of the vertebrates, and it, in correlation, has a more complex structure than the succeeding ganglia, though formed on the same plan. Nerve cells occupy the periphery, and fibres the interior; towards the centre are three groups of small cells one above the other, and connected by a large number of fibres. The front group is intimately connected with the convolutions. Intercrossing of fibres occurs in each optic lobe, coordinating the vision of the components of each eye, but there is no intercrossing between those of opposite eyes.

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[45] Carus' Zool. Anzeig., v. 1, p. 100. Original in Onderzoek. Phys. Labr. Utrecht. 3 R. v. 2, p. 115.

[46] I have not seen the original papers in the Hor. Soc. Ent. Ross., v. 14 and 15. My information is taken from the Journ. Roy. Micr. Soc., v. 2, p. 863. See also Comptes Rend., v. 89, p. 475.

[47] Comptes rend., 1879, p. 378. Ann. Mag. Nat. Hist., Nov. 1879, p. 398.

Dr. J. H. L. Flögel[48] makes the most important contribution yet given to the knowledge of the internal structure of the insect brain. He has made consecutive sections of the brains of very many species, and the paper is accompanied by a dozen selected photographs from these preparations. In the cockroach, for example, he succeeds in making 60-80 transverse, and in one case even 350 longitudinal, sections. This insect was unexpectedly found to have a remarkable brain development, perfectly comparable with that of the higher hymenoptera. The most important parts of the brain are those forming a sort of interior framework, on which the rest of the brain is seemingly laid. Dr. Flögel proposes permanent names for the different parts of this framework, and finds that, starting with *Blatta*, the parts can be traced upwards through the brain of the hymenoptera, and downwards through the other orders.

Some few of the facts given may be here mentioned. The wasps have a brain, at one end of the series, further removed from that of the ants and bees, than is the latter from *Blatta*. The saw flies stand lowest of the hymenoptera in the scale, while the ichneumons approach the ants. In the lepidoptera, coleoptera, and indeed the other groups in general, the brain is simpler, although it can be easily homologized with the *Blatta* type. In caterpillars some parts are absent or very small, and easily overlooked, and the optical lobes of the imago are, moreover, drawn into the interior of the larval brain. Flögel emphasizes three points: the constant occurence of that part of the framework which he calls the "central body," in the adult, while it is almost obsolete in the lepidopterous larva, but not in the hymenopterous; the size of the *lobus olfactorius* in insects with small antennae, but with evidently great olfactory powers, proves, Flögel believes, that the antennae are the seat of this sense. That they are not auditory organs appears from the fact that where these are elsewhere recognizable, as in the orthoptera, they are not connected with any marked brain centre, like the olfactory lobes. Thirdly, although the so-called framework forms the principal part of the brain, there is absolutely no connection of its fibres with the other parts of the brain to be found, — a quite inexplicable fact. A table illustrating the relations between the brains of different insects is appended to the paper.

Another very valuable contribution to this same subject is Mr. E. T. Newton's paper[49] on the brain of the cockroach; his results, reached without previous knowledge of Dr. Flögel's paper, agree substantially with those of this author. For still further permanence of cerebral nomenclature, Mr. Newton latinizes Flögel's names, and in one or two cases proposes different ones, for various reasons. The clearest figures yet given illustrate the external aspect of the brain *en face* and in profile, while the figures of a model of the internal structures are very useful as a help to interpret the sectional views. A detailed de-

[48] Zeitschr. wiss. Zool., v. 30, Suppl., p. 556.

[49] Quart. Journ. Micr. Sci., v. 19, p. 340.

scription of a number of the latter is given, with good figures. Like Flögel, Newton was unable to find the connection of the internal "framework" with other parts of the nervous system.

Dr. E. Berger has a memoir,[50] which I have not been able to see, on the structure of the brain and retina in the arthropods. It is, however, noticed by Newton in the preceding paper, who says it "is largely occupied with the description of the retina and the structures to be found in the optic lobes of arthropods. It is extremely interesting to find that the peculiar oval bodies which Leydig figured from the optic lobe of *Dytiscus*, and were afterwards described and figured by me in the eye of the lobster are to be found in a more or less modified form in all the insects and crustacea described by Berger. The remarkable crossing of the nerve fibres between the retina and the lenticular bodies is seen not to be peculiar to the lobster. The brains of a number of insects are described, and in each of them the author seems to have found the homologues of the 'mushroom bodies,' although in some, e. g., the diptera, they are very rudimentary."

Our fellow member, Dr. E. L. Mark, has described[51] the nervous system of Phylloxera, correcting Prof. Riley's[52] description. The most striking peculiarity is the want of that concentration found in most of the plant-lice, there being two instead of one, post-oral ganglionic masses, the first of which is a flattened, rounded mass, connected by very stout and short commissures with the second, larger, heart-shaped ganglion, the point of which continues into a median nerve which, shortly, bifurcates. A good figure of the parts is given.

Mr. Jules Künckel emphasizes in a short note[53] the importance of the nervous system as a guide to classification of insects, and discusses the affinities of the different families of diptera on this basis, a matter with which we are not here concerned; but the fact that five families — *Stratiomyidae*, *Conopidae*, *Tabanidae*, *Syrphidae*, and certain acalypterous *Muscidae* — show a decentralization of the nervous system in the adult is very interesting. In these cases the ganglia, which are separated in the embryo, in the larva approach and coalesce, only to be again separated while in the pupal stage. Of the other diptera, some groups show the usual centralizing tendency with the development of the insect, and in others the ganglia remain in the same condition through life.

I have also a reference to a paper[54] by Mr. J. W. Slater on the nervous system, but I have not seen it.

New methods of preparation have given great impetus to the study of the eye, and we find several papers to record besides the independent work of Grenacher, already alluded to. Mr. B. T. Lowne is the author of one[55] on the modifications of the simple and compound eye in insects. The former is believed to be of little use except merely in perceiving the intensity of light. The latter includes two radically different eyes: a true compound eye in the brachycerous diptera, the lepidoptera, orthoptera, and coleoptera; and the aggregate eye in the hymenoptera, nematocerous diptera, hemiptera, and many coleoptera. The details of structure are of course too complex to admit of an intelligible abstract. Müller's, or the "mosaic" theory of vision is regarded as the most probable, and Mr. Lowne's remarks on the sharpness of insect vision are most interesting. *Aeschna*, *Vespa*, and *Bombus* are supposed to see an object 20 feet distant, in the same detail as man would do at 160 feet, and this when the object is in the line of greatest sharpness of vision. *Tabanus* sees in the same way at 20 to 360; *Syrphus*, 20 to 1200, *Noctua*, 20 to 2400, and *Tipula*, 20 to 4800. In Mr. Lowne's view then, the insect eye is far from sharp-sighted, and if he is correct it would seem difficult to explain the delicate patterns of coloration by sexual selection, as has generally been done.

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[50] Arb. Inst. Wien, v. 1, p. 173.

[51] Psyche, v. 2, p. 201, Jan. 1879.

[52] Prof. Riley admits his error in this respect (Psyche, v. 2, p. 225). In the same note he combats Cornu's opinion that the mechanical action of the puncture and the subsequent absorption of liquid, can alone account for the development of Phylloxera, or other, galls.

[53] Comptes rend., v. 89, p. 491.

[54] The Entomologist, v. 12, p. 291.

[55] Phil. Trans., v. 169, p. 577.

Prof. Grenacher's work leads Dr. V. Graber[56] to publish an important paper on the simple eye of the *Tracheata*, especially referring to spiders and myriapods, the latter group having been neglected by Grenacher. The cornea of the simple eye or *stemma*, shows the pore canals as well as the lamination of the rest of the cuticula. The crystalline body (hypoderm) is separated from the retina by a lamella, which is the extension of the inner cuticular membrane which underlies the hypoderm. This fact speaks against the hypodermic origin of the retina. The inner cuticula also extends downwards, clothing the whole retinal elements (*sclera*). The retinal segments are not single cells like those of the facetted eye, but show a basal ganglionic cell and a nucleated distal cylinder. The axial rod of the cylinder in *Buthus* seems to be a direct continuation of the ganglion cell, and so of an optic fibre. The stemma of *Buthus* is not a single optic element, but really a pentamerous compound eye.

Graber also points out the similarity between the auditory elements (in *Acridium*) and the optic elements are described.

Mr. Anton Stecker[57] finds that in the pseudo-scorpion genus *Chernes*, which is usually eyeless, some specimens possess rudimentary eyes. In *Chernes cimicoides* specimens were found with transparent spots in the position of the eyes in chilopods. To these spots an optic nerve proceeds from the optic lobes, but there is no trace of the crystalline rods. About 33 per cent. of the specimens were thus semi-eyed. The rest were totally blind, and wanted the optic nerves. The former class were offspring of seeing parents, while if either parent was sightless, the young were always so. With these most interesting discoveries, is added the fact that the optic nerve seems to send many of its fibres to the connective tissue under the epiderm, thus assuming another function.

Oscar Schmidt[58] in a short paper on the crystalline cone in arthropoda, discusses the mosaic theory of sight. His observations were mostly on the crustacea, a single paragraph refering to *Dyticus*, in the eye of which he succeeded in finding some oblique crystalline cones.

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[56] Arch. Mik. Anat., v. 17, p. 58.

[57] Morphol. Jahrbuch, v. 4, p. 279.

[58] Zeitschr. wiss. Zool. v. 30, Suppl., p. 1.

Graber[59] also describes an organ which he discovered in the antennae of several diptera, which he regards as auditory. This organ lies within the third antennal joint, on the inside and near the base. It is, briefly, a closed globular thick-walled, chitinous capsule, the wall being made up of rounded or oval plates, from each one of which springs interiorly a hair; a layer of epithelial cells surrounds the capsule, and outside of this a *tunica propria*. A large nerve branch runs to this organ, but the intimate connection between the elements of the two could not be made out. Graber thinks, as will be supposed, that the hairs vibrate to sound waves, and he sees nothing to indicate that the organ may be other than auditory. The ordinary hairs clothing the antennae, Graber shows, are in connection with special nerve elements, and are probably organs of touch.

Another singular organ Graber finds[60] in an unknown dipterous larva, and this, too, as it can apparently be nothing else, is thought auditory. It is situated under the dorsal integument, from which it is quite independent, at the junction of the ninth and tenth segments, and just behind the dorsal vessel. It consists of a pear-shaped sac, prolonged backwards into a fine tube, the end of which, lying in the terminal segment, unfortunately could not be demonstrated; but Graber thinks the sac and its tube represent an infolding of the integument. Two diverging muscles inserted on the sides of the eighth segment support the forward end, the sac being thus suspended by two anterior and one posterior (the tube) braces. Within the sac are eight black rounded bodies, borne on short stalks, and looking like so many berries. These bodies — the presumed otoliths — are hung in four pairs, one behind the other, thus giving a segmented character to the organ, which is still more apparent from the fact that the second pair, and the third and fourth — which are united together — lie in separate sacs within the first, like the coats of an onion. The organ is supplied with a nerve on each side, but nothing more definite could be shown. As to this larva, Dr. Hermann Krauss[61] states that it is the larva of *Tabanus autumnalis* L., and that Prof. Brauer pointed out the organ in question to his classes four years ago. Krauss affirms that it is o be found in the perfect insect, by the study of which its nature can perhaps be settled.

With regard to the supposed antennal otocysts of Graber, Dr. Paul Mayer in a letter to Carus' Zool. Anzeiger (v. 2, p. 182), states that these are by no means closed vescicles but are really wide-open mouthed sacs. Moreover that though only one is present in *Syrphus* and *Drosophila*, *Sicus* has at least three, and *Eristalis* a whole series, of them. Indeed, Mayer thinks the size of the third antennal joint stands in direct relation to the number of these organs borne on it. *Musca vomitoria* has nearly fifty, for example, which in this case have been described and figured by Leydig,[62] so that Graber cannot claim them as his discovery. Mayer believes them probably sense organs, and has traced, in stained sections, nerve fibres into the hair-bearing hypodermic cells, but whether they are auditory or olfactory must be decided by future investigations.

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[59] Arch. Mikr. Anat., v. 16, p. 36. Abstract, Journ. Roy. Micr. Soc., v. 2, p. 45.

[60] Ibid., p. 47.

[61] Carus' Zool. Anzeig., v. 2, p. 229.

[62] Müller's Arch., 1860, p. 276, pl. 8. They are also described in Mr. Lowne's monograph on the Blow-fly, London, 1870. This writer believes them olfactory organs.

Dr. Mayer has also published a longer paper,[63] with plates, on the same organs. The hairs in the vesicles are pale and transparent, with rounded tips, and the *cuticula* is also pale and delicate ; each hair belongs to a single cell, which sends up a process into the lumen of the hair. This is always the case, even in the small single-haired fossae. The observations of F. Berte,[64] on the antennae of *Pulex*, are criticized as very inaccurate.

Dr. G. Haller [65] describes the respiratory system of mosquito larvae. The lateral tracheal trunks end separately in the longer anal process. The shorter process has gills furnished with branches from one of the main trunks. In the terminal segments of the larva is also an air reservoir consisting of a number of fine tracheal branchlets, probably supplied by the second trunk. Hairs on the breathing tube are regarded as sensory, and connected with the terminal nerve ganglion. Other hairs on the body, including some resembling lepidopterous scales, are described. The breathing pore is provided with closing valves, but there is no similar arrangement in the pupal breathing horns.

Dr. Philip Bertkau in a paper [66] on a natural system of Arachnids, makes a few remarks on the tracheae of some spiders, figures of which are subjoined.

I have only found one reference to the circulatory system of insects, which is a short note in Carus' Zool. Anzeiger (v. 1, p. 274), by Dr. Béla Dezso, stating that in insects, myriapods and spiders, there are as many pairs of clefts in the dorsal vessel as there are pairs of stigmata.

Schmiedeknecht in a monograph [67] of the Thuringian species of *Bombus*, describes the male genitalia of each species, and he finds in them widely distinct specific characters. Five pieces are recognized in these organs, and German names proposed, but these seem in no way preferable to the latin nomenclature of Thompson.

The types of the external male genitalia of the European butterflies are described and figured by Dr. F. B. White,[68] whose paper will be of value to systematists. The apical segment, the dorsal element of which Dr. White calls the "tegumen," is wrongly regarded as the eighth instead of the ninth.

Besides the paper on the gizzard in ants already mentioned, Dr. Aug. Forel has published another important anatomical contribution [69] on the poison and anal glands of these insects. A careful description is given of the former, and of its modifications in different genera. According to the character of the poison reservoir the *Formicidae* are divided into two sharp groups, *Camponotidae* and *Dolichoderidae*. In the former, the reservoir is very large, and dorsally between its *tunica propria* and *intima* it is padded, so to speak, with the folds of an immensely long tube, simple or branching, which is probably a continuation of the tube in the poison glands, and which, after winding over the reservoir, finally opens into it. In the second group the reservoir is smaller, the homologous tube is short, and ends in a knob-like expansion in the interior of the reservoir. Moreover, the tube does not simply pierce the wall of the reservoir, but pushes it inwards, as it were, thus making for itself another envelope. The histology of the different parts is fully discussed, and many important general deductions are made. Besides the poison apparatus, Forel has discovered that the *Dolichoderidae* also possess anal glands and sacs, similar to those found in many insects, especially beetles. This anal sac lies above the digestive tract, and opens above the anus. Its secretion is probably mephitic, and recalls the secretion of Wolff's mandibular glands in the bees. The author believes that Wolff is greatly in error in regard to his supposed organ of smell in the bees, which have indeed little development of this sense. From simple experiments on *Polistes* the antennae certainly seem the seat of the organ in question.

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[63] Mem. R. Accad. Lincei. Roma, 4 maggio 1879.

[64] Ricerche Lab. Anat. norm. R. Univers. Roma, 1878, v. 2, p. 77–82.

[65] Arch. Naturg., v. 44, p 91.

[66] Arch. Naturg., v. 44, p. 351.

[67] Jenaische Zeitschr. Nat., v. 12, p. 303.

[68] Linn. Trans., s. 2, Zool., v. 1, p. 357.

[69] Zeitschr. wiss. Zool., v. 30, Suppl. p. 28.

The sting of the honey-bee is the subject of a short paper[70] by Mr. J. D. Hyatt. The hard parts and their mode of action are described, and illustrated by sectional and other drawings. Nothing new seems to be made out.

Two papers relating to the male and female reproductive apparatus of the cockroach, I have not seen. One, however, by Mr. Siegf. Brehm[71] appears to be written in Russian. The second[72] by Mr. Duchamp, treats of the structure and development of the egg capsule; a subject also noticed by Dr. H. Kadyi, in a note[73] on the egg laying apparatus of the cockroach. The sexual opening lies in a chamber — the vulva — formed by two shield-like processes of the seventh abdominal segment, and covered above by the anal segments. At the base of the vulva opens the vagina, a coecal, flattened tube, containing numerous chitinous structures, and among them three palpus-like organs. On the ventral vaginal wall is the common opening of the two oviducts; and opposite that of the *recept. seminis*, and of the two accessory glands, a large branched one on the left, and a small one, hitherto overlooked, on the right. These glands pour their secretion over the closed vulvar plates, to form the end of the egg case, which is thus a cast of the inner surface of the plates. As the eggs are placed in position, the end of the case is gradually protruded, until it contains the regular number — sixteen — one from each ovarian tube. The posterior directed end of the escaping egg is placed downward in the case, and the eggs from the right ovary occupy the left side of the case, and *vice versa*. The inner end of the latter bears the marks of the papillae which hold it, and thus differs from the outer end.

In concluding this review, I have only to say that I do not claim it as a complete record, but I hope to have given you a fair idea of the amount and character of the latest additions to our knowledge of insect anatomy. EDWARD BURGESS.

Boston, 9 Jan. 1880.

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[70] Amer. Quart. Micr. Journ., v. 1, p. 3.

[71] Dissertatio Inaug., St. Petersburg, 1879.

[72] Revue Sc. Nat., Montpellier, v. 7, p. 423.

[73] Carus' Zool. Anzeig., v. 2, p. 632.

PSYCHE.

CAMBRIDGE, MASS., MARCH 1880.

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G: D.

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Corrections of errors and notices of omissions are solicited.

Abbe, E. P. Experiments with foul brood. (Amer. bee journ., 1879, v. 15, p. 450.)
A method of cure is described. *A. J: C.* (1519)

Bees do not eat grapes. (Amer. bee journ., 1879, v. 15, p. 26.)
The testimony of several persons who have kept bees and raised grapes side by side for years. *A. J: C.* (1520)

[**Bees,** management of.] Water, given to bees in confinement, makes them able to endure it much longer. (Amer. bee journ., 1879, v. 15, p. 340.)
The water is put in small bottles, or vials. A wick passes from within, through a small hole in the cork. The bees sip water from the wick. *A. J: C.* (1521)

Benton, Frank. The next progressive step. (Amer. bee journ., 1879, v. 15, p. 507.)
The history, characteristics, and superiority of the Cyprian bees are given. *A. J: C.* (1522)

Benton, Frank. Races of bees. (Amer. bee journ., v. 15, p. 73.)
Ten different races or varieties and several species are described. *A. J: C.* (1523)

[**Books** injured by insects.] (Lib. journ., Jul.–Aug. 1879, v. 4, p. 292.)
Discussion, by H. A. Hagen, W. Flint, I: P. Langworthy and S: H. Scudder, upon Hagen's "Insect pests in libraries" (*l. c.*, p. 251–254) [Psyche, Rec., no. 1529]. *B: P. M.* (1524)

Cat's lively experience with bees (A). ("Virginia city [Nev.] enterprise," . . .) (Springfield [Mass.] d. republican, 14 Oct. 1879, p. 8, col. 4, 11 cm.)
A cat disturbs a hive of *apis.* *G: D.* (1525)

Fawcett, Edgar. Fireflies. (Atlantic monthly, July 1877, v. 40, p. 84–85.)
In verse. *G: D.* (1526)

Flint, Weston. The croton bug as a library pest. (Lib. journ., Sept.–Oct. 1879, v. 4, p. 376–377, 25 cm.)
Notice. (Academy, 6 Dec. 1879, p. 409, col. 1, 3 cm.)
Blatta germanica and *b. orientalis* injure bindings of books. *Pyrethrum* as a remedy. Quotes a letter by C: V. Riley on the subject. *G: D.* (1527)

Fry, E: On the utility to flowers of their beauty. (Contemporary rev., Dec. 1879, p. 574–587.)
On fertilization of flowers and its dependence on their beauty as an attraction to insects. "I see in nature both utility and beauty; but I am not convinced that the one is solely dependent on the other." *G: D.* (1528)

Hagen, Hermann August. Insect pests in libraries. (Lib. journ., Jul.–Aug. 1879, v. 4, p. 251–254.) (Bost. morn. journ., 3 July 1879, 49 cm.
Extract. (Bost. d. advertiser, 3 July 1879, no. 22107, v. 133, no. 158, p. 4, col. 2, 18 cm.)
Review, [by J: O. Westwood,] entitled "Insects in the library." (Gardener's chronicle, 13 Sept. 1879, v. 12, no. 298, p. 340, col. 1–2, 31 cm.)
Abstract, entitled "The insect enemies of books." (Journ. applied sci., Oct. 1879, v. 10, p. 152, 20 cm.)
Injuries to books by *anobium*, *dermestes*, *termes*, *ptinus fur*, and *blatta*. Means of preventing insect-injuries in libraries. *G: D.*
History of observations on the subject. This paper is discussed, *l. c.*, p. 292. For the citation of works, see the author's "Literature concerning injuries to books by insects," (*l. c.*, p. 373–374) [Psyche, Rec., no. 1530]. *B: P. M.* (1529)

Hagen, Hermann August. Literature concerning injuries to books by insects. (Lib. journ., Sept.–Oct. 1879, v. 4, p. 373–374.)
Accompaniment to the author's "Insect pests in libraries" (*l. c.*, p. 251–254) [Psyche, Rec., no. 1529]. Gives the titles of 18 works (from 1724 to 1876) with analysis of their contents. *B: P. M.* (1530)

Hasbrouck, J. Fertilization [of queen bees] in confinement. (Amer. bee journ., 1879, v. 15, p. 518.)
The writer says he accomplishes this in a barrel, in one end of which is an opening covered with glass. *A. J: C.* (1531)

Hollis, W. Ainslie. Insect galls buds. (Nature, 29 May 1879, v. 20, p. 95, 7 cm.)
Combats a statement, made in A. S. Wilson's "Insect galls buds" (Nature, 15 May 1879, v. 20, p. 55) [Psyche, Rec. no. 1554], that "all insect-galls are in reality leaf-buds, or fruit-buds." *G: D.* (1532)

Insect enemies of books (The). (Journ. applied sci., Oct. 1879, v. 10, p. 152, 20 cm.)
Abstract of H. A. Hagen's "Insect pests in libraries" (Lib. journ., Jul.–Aug. 1879, v. 4, p. 251–254) [Psyche, Rec., no. 1529]. *G: D.* (1533)

Jeffrey, H. L. Experiments with eggs and larvae of bees. (Amer. bee journ., 1879, v. 15, p. 443.)
It is shown that exposing the eggs to a low temperature retards development of the embryo and larva. *A. J: C.* (1534)

Kedzie, Robert F. The composition of honey. (Amer. bee journ., 1879, v. 15, p. 409.) *A. J: C.* (1535)

M., H. B. Curious facts concerning the cochineal insect in the Canary Islands. (Sci. amer., 22 Nov. 1879, v. 4, p. 325, col. 1, 29 cm.]

Reprint, entitled "The cochineal insect." (Journ. applied sci., Jan. 1880, v. 11, p. 11, 27 cm.)

Mode of obtaining the eggs and rearing *coccus* as practised in the Canary Islands. *G: D.* (1536)

Michard, A. [Swarming of butterflies, probably *liparis salicis*, at Montluçon, France.] (Feuilles des jeunes naturalistes, Jan. 1880, p. 39.) *G: D.* (1537)

Mivart, St. G: The forms and colours of living creatures. (Contemporary rev., Oct. 1879, p. 313–333.)

General; contains brief allusions to insect-coloration and luminosity. *G: D.* (1538)

[**Mosquito** helps to herd cattle by causing them to congregate and be more docile.] (Springfield [Mass.] d. republican, 29 Aug. 1879, p. 8, col. 1, 3 cm.) *G: D.* (1539)

New insect pest (A). (Springfield [Mass.] d. republican, 9 July 1878, p. 4, col. 3, 15 cm.)

Brief account of *anthrenus scrophulariae*, its distribution in America, and the means used against it. *G: D.* (1540)

Noel, Paul. Chasse aux lépidoptères nocturnes. (Feuille des jeunes naturalistes, 1 Dec. 1879, p. 26.)

The author burns short pieces of magnesium tape, from time to time, near a lighted lantern, suspended about 1.5 metres from the ground. The insects are attracted from a distance by the bright light of the magnesium, and remain about the lantern. *G: D.* (1541)

Piatt, J: James. The moth. (Atlantic monthly, Aug. 1874, v. 34, p. 167.)

Four lines in verse. *G: D.* (1542)

Riley, C: Valentine, *see* Flint, Weston, The croton bug as a library pest [Psyche, Rec., no. 1527].

Root, A. I. The A B C of bee culture: a cyclopedia of every thing pertaining to the honey bee: bees, honey, hives, implements, honey plants, &c., &c.: compiled from facts gleaned from the experience of thousands of bee-keepers all over our land, and afterward verified by practical work in our own apiary. Medina, Ohio, A. I. Root, 1879, 265 p. il., cl. $1.25.

The author is editor of one of the leading U. S. apicultural journals, an extensive manufacturer and dealer in apiarian implements, a cultivator of bee-plants, and a practical apiarist, of large experience. The book is in form of a dictionary. *A. J: C.* (1543)

Sandal wood. (Sci. amer., 16 Aug. 1879, v. 41, p. 97, col. 1–2, 34 cm.) (New remedies, Oct. 1879, v. 8, p. 300–301, 43 cm.)

Notes that, in India, according to Dr. Berthold Seemans, "After felling the trees [*santalum*] the bark is removed at once, the trunks are cut into billets two feet [60 cm.] in length, and these are buried in dry ground for about two months, during which time the white ants [*termes*] eat away all the outer wood without touching the heart." *G: D.* (1544)

Saunders, W: [Portrait, full page.] (New remedies, Oct. 1877, v. 6, no. 10.) *G: D.* (1545)

Siewers, C: Godfrey. White satin and black lined leaf-roller. (Valley naturalist, 1878, v. 1, p. 6.)

Conchilodes platinalis, and perhaps all *tortricidae*, are jumpers. *B: P. M.* (1546)

Thiriat, Xavier. Phosphorescence des scolopendres [*scolopendra electrica*]. (Feuille des jeunes naturalistes, Dec. 1879, p. 26.) *G: D.* (1547)

Treat, Mary. Notes on the slave-making ant. (Amer. nat., Nov. 1879, v. 13, p. 707–708.)

Battles between *formica sanguinea* and *f. fusca*. *F. sanguinea* also attacks *f. schaufussii* and two species of *aphaenogaster*, but never attacks *camponotus meleus* and *polyergus lucidus*. *G: D.* (1548)

Trelease, W: The fertilization of our native species of *clitoria* and *centrosema*. (Amer. nat., Nov. 1879, v. 13, p. 688–692, 8 fig.)

Mentions a few insects. *G: D.* (1549)

[**Wasps'** nests ignited by spontaneous combustion.] (Lebanon [Ill.] journal, 1 Nov. 1878, 7 cm.) (Psyche advertiser, Sept.–Dec. 1878, p. 8.) *G: D.* (1550)

[**Westwood,** J: Obadiah.] Insects in the library. (Gardener's chronicle, 13 Sept. 1879, v. 12, no. 298, p. 340, col. 1–2, 31 cm.)

Rev. of H. A. Hagen's "Insect pests in libraries" (Lib. journ., 1879, v. 4, p. 251–254) [Psyche, Rec., no. 1529], made before the receipt of Hagen's supplementary paper entitled, "Literature concerning injuries to books by insects" (l. c., p. 373–374) Psyche, Rec., no. 1530], and noticing several insects, publications, and remedies not mentioned by Hagen. *B: P. M.* (1551)

Whistling tree (The). (Colonies and India, 7 Feb. 1880, p. 11, 9 cm.)

Cup-shaped galls or secretions of some insect upon a species of acacia tree, in Nubia and Soudan, cause, according to Dr. Schweinfurth, a whistling as the wind passes through the tree. *G: D.* (1552)

Willard, W. J. Bees eaten by shrew, *sorex*. (Amer. bee journ., 1879, v. 15, p. 161.)

Does serious damage to bees if they are left on their summer stands in winter. *A. J: C.* (1553)

Wilson, A. Stephen. Insect galls buds. (Nature, 15 May 1879, v. 20, p. 55, 16 cm.)

Crit. rev., by W. A. Hollis. (Nature, 29 May 1879, v. 20, p. 95, 7 cm.)

"All insect-galls are in reality leaf-buds, or fruit-buds They are not mere amorphous excrescences." *G: D.* (1554)

NECROLOGY FOR 1879.

Haag, Georg. [Biog. note.] (Zool. Anzeiger, 9 Feb. 1880, jahrg. 3, p. 72.)

Dr. Haag was b. 10 Oct. 1830 at Frankfort-on-the-Main, where he died 20 Nov. 1879. Better known to entomologists as Dr. Haag-Ruthenberg, Ruthenberg being the maiden name of his wife. *G: D.* (1555)

ENTOMOLOGICAL ITEMS.

M. Dalmas — so *Les Mondes* informs us — has succeeded in destroying the phylloxera by wrapping thin copper wire round the stems of the vine, and passing the current from a powerful voltaic battery through it. Both the mature insects and their eggs are said to be completely disorganized by the electricity.—*Athenaeum,* 27 Dec. 1879, p. 853.

The influence of quinine upon silkworms has been satisfactorily proved by C. LeDoux. Broods of caterpillars suffering from *flacquerie* were speedily restored by sprinkling their food with quinine sulphate. The same treatment proved successful in cases of "pebrine" with open wounds.—*Mo. journ. sci.,* Nov. 1879, s. 3, v. 1, p. 765.

A revision of the Lampyridae will shortly be published by Mr. Henry S. Gorham of Shipley, Horsham, England. Mr. Gorham would be glad to see specimens of this group from America, and especially from Central America below the United States to the Isthmus of Darien. He also desires to obtain specimens of the genera *Pleotomus* LeC., *Phausis* LeC., *Microphotus* LeC., *Phengodes* Hof., and *Pierotus* LeC.

Abrasion oil is, according to the "Œst. Land wirth. Wochenblatt," obtained in China from the seeds of *Elaeococca cordata,* and is said to be an excellent protective against noxious insects. The tree, which belongs to the family of the *Euphorbiaceae,* prospers in the south of France, where its culture is recommended, in the hope of the oil proving a specific for the *Phylloxera* and the *Oidium.* — Mo. journ. sci., Nov. 1879, s. 3, v. 1, p. 756.

Cases of poisoning by caterpillars have been observed both in cows and ducks. The former experienced gastric symptoms, diarrhoea, loss of appetite, &c., but were all restored by means of mucilaginous drinks and a diet of boiled potatoes and bran. Ninety ducks were turned into a cabbage-field infested with the caterpillars of the common white (*Pieris brassicae*). In one afternoon the field was almost clear, but two ducks died after an hour. The next morning twenty were found dead, and altogether fifty-three perished. The flesh of the dead, on examination, was found to resemble that of cattle which die of gangrene, indicating true poisoning. — *Mo. journ. sci.,* Nov. 1879, s. 3, v. 1, p. 765.

SOCIETY MEETINGS.

The regular meetings of the Cambridge Entomological Club will be held at 19 Follen St., at 7.45 p. m., on the days following: —

9 Jan. 1880.
13 Feb. „
12 Mar. „
9 April 1880.
14 May „
11 June „

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following: —

28 Jan. 1880.
25 Feb. „
24 Mar. „
26 Apr. 1880.
26 May „

B: Pickman Mann, *Secretary.*

The annual meetings of the Entomological Section of the American Association for the Advancement of Science will begin at 2 p. m., on Tuesday, 24 Aug. 1880, at a place yet to be determined, in Boston, Mass. Members who intend to present communications that may provoke discussion are requested to allow the Secretary to announce their subjects, in order that other members may come ready to enter into a thorough discussion.

B: Pickman Mann, *Secretary,*
Cambridge, Mass.

The regular meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following: —

9 Jan. 1880.
13 Feb. „
12 Mar. „
9 Apr. 1880.
14 May „
11 June „

James H. Ridings,
Recorder.

The semi-annual meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following: —

8 Dec. 1879.
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VI. Jahrg. 1880.

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No. 70 was issued 6 Mar. 1880.

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Cambridge, Mass.

Vol. 3. No. 72.
APRIL 1880.

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CAMBRIDGE, MASS., U. S. A.: PUBLISHED BY GEORGE DIMMOCK.

YEARLY SUBSCRIPTIONS, $1. MONTHLY NUMEROS, 15 c.

[Entered as second class mail matter.]

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PSYCHE.

LIFE HISTORY OF *PLEOTOMUS PALLENS* LEC.

BY HELEN SELINA KING, AUSTIN, TEXAS.

The habitat of this species of the subtribe *Lampyrini* is western Texas, where the mature form appears in May, a month later than several species of *Photinus*. Both sexes are phosphorescent, the ♂ feebly so, emitting a greenish light, without rays, but sufficiently bright to betray his presence; the ♀ is much more brilliant, her light being sufficient to show not only her body, but also surrounding objects for a distance of several centimetres. After oviposition this light declines, and the female, who seems to have assumed the perfect form for the purpose alone of laying eggs, soon dies. She does not feed, and is too helpless to move far from the place of her final metamorphosis, owing to the feeble support which her disproportioned body receives from her feet. When creeping, as she does by spasmodic efforts, she touches objects with her palpi, and moves her head from side to side. The eggs are deposited in one or more pits, which the female makes in the soft moist earth with her abdomen.

The eggs are smooth, round, pale yellowish, about the size of black mustard seed, and, as far as I am aware, not phosphorescent. In six weeks they produce young larvae 4 mm. long, cinereous on dorsum, dull white on venter, and emitting light from the ventral surface of the posterior segment. When fully grown, the larva, except that the color is different, and the body is less depressed, is precisely similar to that of the commonest species of *Photinus* larva found here, which is perfectly represented in figure 431 of Packard's "Guide to the Study of Insects." It has twelve segments exclusive of the head, which latter is composed of two flattened narrower segments, the inner one forming the neck, and both retractile within the thorax. It feeds on snails; and sheds its larval skin at least twice, possibly oftener, before reaching maturity. Under confinement in a pot of earth, with snails for food, it assumes the pupa state in about seven weeks, but it may attain its growth sooner when at large. Both the larval moults and the transformation to pupa are performed by the splitting of the membrane on the pleura through the first three segments, and its removal over the posterior end of the abdomen.

The shield of the ♂ pupa immediately after its liberation from the larval skin, seems to consist of two fused segments; the three following segments are narrow, and the middle one of these has a transverse depression suggesting the fusion of two segments at that point. Following these are seven abdominal segments. The pectinate antennae and the wing cases are seen, and on the propygidium the phosphorescent vesicles are visible as clear greenish yellow spots. From the terminal segment are two straight processes. The pleural region, antennae, and feet distinguish this pupa from those of *Photinus.* The final metamorphosis takes place in six days.

The ♀ form assumed the pupa condition one week later than the ♂. It has two white tubercles or small processes on the sides of the wing-bearing segments, indicating the position of the future rudimentary elytra. The pleural region is different from that of the ♂, and the parts of the mouth are not sheathed separately as in the ♂, but are as it were muzzled. Antennae and eyes are not visible; the shield seems to consist of two fused segments, as seen through the thin membrane. There are seven abdominal segments. The whole body is of a salmon color. This pupa matures in six days and perfects as an apterous imago with rudimentary elytra.

Thus we find that under artificial management the eggs will mature sufficiently to hatch in five weeks, the larva requires about seven weeks to reach the pupa stage, and the latter lasts only six days, the ♂ in one instance accomplishing its cycle one week sooner than the ♀. In a few days after becoming perfect, the ♂ dies, and the ♀, after wandering a little, lays her eggs and dies also.

Pleotomus pallens ♂ is rare. Head covered by the prothorax. Eyes large, dark-purplish, contiguous. Labial palpi visible at tip. Maxillary palpi small. Mandibles not prominent, very small. Antennae short, approximate, 14-jointed, bipectinate, usually folded so as to seem unipectinate, situated in front of the eyes and parallel with anterior edge of the prothorax, their tips recurved, color fuscotestaceous. Prothorax finely punctulate, subhyaline, elevated at its base; its sides beneath embracing the neck and forming a collar for the head when the latter is protruded: it is broader than in the ordinary species of firefly, fuscotestaceous, with rosy centre in some, in others with transverse, irregular confluent pink spots on the posterior part; the flanks beneath this part are also pink. Elytra striate, elevated at their base, the concave humeral region embracing the sides of the abdomen, whence the elytra slope backward to a narrow dehiscent point, leaving nearly three segments visible. Wings same length as elytra, and smoke color. Feet feeble and compressed, same color as the body. Seven ventral segments short, the last one pointed and partly retracted within the penultimate, which is emarginate.

On the last abdominal ring there is a spot on the anterior, outer margin of dorsum and venter, seen in the day as of a deeper yellow than the surrounding parts. Through this at night comes the phosphorescence, not in flashes, but as two oval spots, equally evident above and below, but more feeble than in any other firefly known to me. The ♂ has the same quick spasmodic motion noticed in the ♀. He feeds sparingly on the common garden snail, probably on its slime, being, I should think, too feeble to be actively aggressive, though I have seen him cling to a snail shell with much persistency.

Pleotomus pallens ♀, though apparently more abundant than the ♂, is yet comparatively rare. It is of a buff or salmon color, with eleven segments, pink on their posterior margins, and overlapping. Head narrow, with projecting muzzle, but imperfect organs of manducation. Eyes small, round, black, on sides of the head. Antennae shorter than thorax, approximate, situated in front of the eye, pale yellow, feebly pectinate. Thorax with margin reflexed, subrugose. Adjoining the shield are the rudimentary elytra, semicircular and very small. Feet feeble, compressed; the body is disproportionately large, and the insect consequently moves with sudden nervous action, and pauses every few steps.

Though there are no special phosphorescent vesicles visible through the membrane, yet it emits light from the entire ventral surface of the three posterior segments. This is very brilliant, and when less intense posteriorly, appears diffused over the body. This brilliancy continues until oviposition. This ♀ insect is similar to Packard's illustration 428, of an apterous ♀ from Madagascar, plus the aborted elytra and pectinate antennae.

NOTE ON NORTH AMERICAN *TRYPETIDAE.*

BY CHARLES ROBERT OSTEN SACKEN, HEIDELBERG, GERMANY.

Among a number of diptera, collected by Mr. J. Boll in Dallas, Texas, and purchased by me in Geneva a short time ago, there were 25 ♂ and ♀ specimens of a *Trypeta*, bearing on a label "bred from galls on *Ambrosia*." The insect could be easily identified with *T. gibba* Loew, and as the habits of this species were hitherto unknown, I deem it worth the while to put Mr. Boll's observation on record.

The gall, which is likewise in the collection, is an oblong swelling of the stem, probably terminal.

The habits of the following North American *Trypeta* have been hitherto investigated and published (the name of the discoverer is in parentheses): —

Rhagoletis pomonella. — Fruit of the apple-tree (Walsh).
Oedaspis polita. — Gall on *Solidago* (O. S.).
" *gibba.* — Gall on *Ambrosia* (Boll).
Eurosta solidaginis. — Gall on *Solidago* (Harris).
Eutreta diana. — Gall on *Artemisia tridentata* (Riley).
Aspilota alba. — Seeds of *Vernonia* (Riley).

This is a very small number, in comparison to that of the described N. A. *Trypeta*; but the most striking circumstance in connection with it is that among six *Trypeta*, whose habits are known, not less than *four* should occur in galls, and only *one* in the heads of a composite flower. In Europe the *Trypeta* bred from galls form an imperceptible minority, and most of the species are obtained from the heads of composites. Compare, for instance, the list of 60 species bred by Frauenfeld (Verh. k.-k. zool.-bot. Gesell. Wien, 1863, p. 221–224), among which only *three* formed galls on the stem of the plant.

It would be worth while for American entomologists to collect dry heads of composite plants in autumn, for the purpose of breeding *Trypeta*; a large number of new species of these pretty flies would probably be obtained.

September, 1879.

PSYCHE.

CAMBRIDGE, MASS., APRIL 1880.

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PROCEEDINGS OF SOCIETIES.

ENTOMOLOGICAL SECTION OF THE BOSTON SOCIETY OF NATURAL HISTORY.

28 JAN. 1880. — Mr. S: H. Scudder showed some excellent drawings of fossil hemiptera, made by J. H. Blake. — Dr. H. A. Hagen read an additional note upon the larva and fly supposed to have been taken from a girl's neck, in Toronto, and gave a list of the instances in which *Sarcophaga* had been found in the human body. He also read a paper on the literature relating to galls. — Mr. E: Burgess described the structure and physiology of a butterfly's proboscis.

25 FEB. 1880. — Mr. S: H. Scudder showed some plates on which were figured all the fossil insects known from British Columbia. — Dr. H A. Hagen read a paper on the mouth of *Nemognatha*, criticising Hermann Müller's speculations on the development of the insect proboscis. Dr. Hagen discussed the results of Dr. Palmen's studies on the tracheal system of insects, describing his own views of the condition of the stigmata during pupation, &c., and showed specimens and drawings to illustrate the respiratory apparatus of many water insects. — Mr. E: Burgess made further remarks on the structure of the butterfly proboscis.

24 MAR. 1880. — Mr. E: Burgess showed under the microscope the structure and explained the workings of the pharyngeal bulb in the head of lepidoptera; he showed also the structure and arrangement of the muscles in the proboscis.

B: PICKMAN MANN, *Secretary.*

REVIEWS.

KATTER'S INDEX ENTOMOLOGICUS Pars I [see Rec., no. 1610] is a list of the entomologists of Europe as far as its author has been able to learn their names, together with their addresses, the departments of entomology to which they give their especial attention, and an indication of those desiring to exchange specimens. To the above is added a list, extracted from the *Naturalists' Directory* (Salem, 1878), of 73 American collectors desiring to exchange, and a list of the entomological societies and publications of the world. Although the list is defective for countries outside of Germany, yet the following comparison, based on a hasty count, not including the five pages of additions and errata, may be of interest. The entomologists and collectors enumerated are distributed as follows: Germany, 740; Austria, 213; Switzerland, 97; Holland, 84; Belgium, 93; Italy, 128; Spain, 19; Portugal, 2; Greece, 3; Roumania, 1; Russia, 58; Finland, 8; Sweden, 26; Norway, 2; Denmark, 4; England, 433; Scotland, 15; Ireland, 3; France (whose coleopterists are not included), 197; total, 2126. Of entomological societies, Europe is credited with 17; America, 4, and Australia, 1.

G: D.

BERNHARD GERHARD'S catalog of the macrolepidoptera of North America [see Rec., no. 1594] seems to have received but little notice at the hands of entomologists. Like most publications of its kind which have been compiled in localities distant from the land the fauna of which they enumerate, Gerhard's catalog is imperfect and incomplete in many particulars. This catalog assumes to give the synonymy of our species, but contains the names of only 103 genera of *rhopalocera* out of over 150 names which may fairly be termed in modern use. It is useless to call attention to special errors, as our species are so well cataloged by American writers. *G: D.*

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [ ], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

Corrections of errors and notices of omissions are solicited.

Abbott, C: C. Swarming of a brood of winged ants [*formica*]. (Amer. nat., June 1873, v. 7, p. 369–372.)
G: D. (1556)

Aldrich, C: Wrens and the bee-moth. (Amer. nat., April 1879, v. 13, p. 262.)
Thinks wrens, which nested near hives of *apis mellifica*, lessened the number of *galleria cereana.* *G: D.* (1557)

[**American** association for the advancement of science — *Entomological club* — *Saratoga* [*N. Y.*] *meeting* (1879).] Convention of scientists. (Springfield [Mass.] d. republican, 27 Aug. 1879, p. 4, col. 6, 10 cm.)
Notice of the meeting of the association, and of the doings of the club. *G: D.* (1558)

Balfour, Francis Maitland. On certain points in the anatomy of *peripatus capensis.* (Zool. Anzeiger, 23 June 1879, jahrg. 2, p. 332–335.)
Affinities of *peripatus* based upon study of the segmental organs, the nervous system and the so-called fat bodies of Moseley. *G: D.* (1559)

Baly, Joseph S. Descriptions of a new genus and of new species of *halticinae.* (Ann. and mag. nat. hist., April 1878, s. 5, v. 1, p. 312.)
Describes the genus *oedionychis*, and *o. recticollis* and *o. chevrolatii*, from Mexico. *R. H.* (1560)

Boisduval, Jean Alphonse. Species général des lépidoptères hétérocères. Par MM. Boisduval et Guenée. Tome 1er. Sphingides, Sésiides, Castnides. Paris, Roret, 1874. 4 + 568 p., 23 × 15.
General classification and description of species of the families mentioned. References to the discussion of North American material are contained in Psyche, 1879, v. 2, p. 265–270. *B: P. M.* (1561)

Bowditch, F: C. Habits of *monohammus dentator.* (Amer. nat., Aug. 1873, v. 7, p. 498–500.)
Describes larva, pupa, and borings in *pinus mitis.*
G: D. (1562)

Breitenbach, Wilhelm. Ueber die Function der Saftbohrer der Schmetterlingsrüssel. (Entom. Nachrichten, 15 Feb. 1880, jahrg. 6, p. 29–34.)
Discusses the function of Fritz Müller's "Schmeckstifte" on the end of the proboscis of lepidoptera. *G: D.* (1563)

Breitenbach, Wilhelm. Zur Systematik der Lepidopteren. (Zool. Anzeiger, 11 Aug. 1879, jahrg. 2, p. 427–428.)
Consideration of the appendages of the proboscis as a basis for grouping lepidoptera. *G: D.* (1564)

Brendel, F: Intelligence in *canthon.* (Amer. nat., Oct. 1879, v. 13, p. 654–655.)
G: D. (1565)

Cochineal insect (The). (Journ. applied sci., Jan. 1880, v. 11, p. 11, 27 cm.)
Reprint of H. B. M.'s "Curious facts concerning the cochineal insect . . ." (Sci. amer., 22 Nov. 1879, v. 4, p. 325, col. 1,) [Psyche, Rec., no. 1536].
G: D. (1566)

Colman, A. R. Premium essay on the diseases of swine. (Trans. dept. agric. state of Ill. for 1877, 1878, v. 15, [n. s., v. 7,] p. 323–350, 6 fig.)
Treats (p. 328–331, fig. 3) of mange or itch — *scabies* — caused by *sarcoptes suis*, and gives a highly magnified figure of the insect. *B: P. M.* (1567)

Cook, Albert J: A formidable bee-enemy, *mutilla coccinia.* (Amer. bee journ., 1879, v. 15, p. 464.)
Enters hives and kills and eats bees. Seems not to mind the attacks of the bees. Found from Mo. to Texas.
A. J: C. (1568)

Cook, Albert J: Another bee enemy, *erax?* (Amer. bee journ., 1879, v. 15, p. 399.)
A species of *erax* from Louisiana kills bees; described and figured. *A. J: C.* (1569)

Cook, Albert J: Bee enemy, *stivetrus diana.* (Amer. bee journ., 1879, v. 15, p. 370.)
This bug sucks the blood from the bees in North Carolina. *A. J: C.* (1570)

Cook, Albert J: Honey dew on the tamarack. (Amer. bee journ., 1879, v. 15, p. 353.)
This nectar appears in great quantity, and is very attractive to the bees. It is shown to come from the *lachnus caricifex.* The character and habits of the louse are described. *A. J: C.* (1571)

Cook, Albert J: The *lecanium* of the tulip tree. (Amer. nat., May 1879, v. 13, p. 324–326, il.)
Describes and figures females of *lecanium tulipiferae*, a new species found on *liliodendron tulipifera*, at Lansing, Michigan. *Apis mellifica* collects the exudation from this *lecanium.* How to destroy *lecanium tulipiferae.*
G: D. (1572)

Cook, Albert J: Parthenogenesis in the honey-bee. (Amer. nat., June 1879, v. 13, p. 393–394.)
Defense of Dzierzon's theory of parthenogenesis of *apis mellifica* against the statements quoted in "The oviposition of the queen bee and Dzierzon's theory" (Amer. nat., April 1879, v. 13, p. 260–261) [Psyche, Rec., no. 1621]. A note by *Editors Naturalist* is added. *G: D.* (1573)

Cook, Albert J: Pollen masses of species of *asclepias* not destructive to bees. (Amer. bee journ., 1879, v. 15, p. 426.)
A. J: C. (1574)

Cook, Albert J: The sting of the worker bee. (Amer. bee journ., 1879, v. 15, p. 542, il.)

The sting and method of using it are described.
A. J: C. (1575)

Cook, Albert J: The tongue of the honey bee. (Amer. bee journ., 1879, v. 15, p. 490, il.)

The tongue and the method of sipping honey are described. *A. J: C.* (1576)

Corey, J: G. Remedy for foul brood. (Amer. bee journ., 1879, v. 15, p. 324.)

This is a fungoid disease, fatal to larval bees. "A sure cure" is described. *A. J: C.* (1577)

Croneberg, A. Ueber die Giftdrüsen von *solpuga.* (Zool. Anzeiger, 25 Aug. 1879, jahrg. 2, p. 450–451.)
G: D. (1578)

Dadant, C: Granulation of honey a test of purity. (Amer. bee journ., 1879, v. 15, p. 1.)

It is asserted that only pure honey granulates, though some kinds of honey will not crystalize. *A. J: C.* (1579)

Decoction of the tomato-plant [*lycopersicum esculentum*] as an insecticide. (New remedies, Oct. 1879, v. 8, p. 294, 4 cm.)

From *Pharm. journ. and trans.;* originally from the *Deutsche Gärtner-Zeitung.* *G: D.* (1580)

Dewitz, H. Insectenmisbildung. (Zool. Anzeiger, 10 March 1879, jahrg. 2, p. 134–136, 1 fig.)

Foot on the left side of the breast of the larva of *atta insularis* from Cuba. *G: D.* (1581)

Dezso, Béla. Uber den Zusammenhang der Kreislaufs- und respiratorischen Organe bei den Arthropoden. (Zool. Anzeiger, 11 Nov. 1878, jahrg. 1, p. 274.)

Brief summary of results of study at the zoological station at Triest. "In the insecta, arachnida and myriapoda there are as many pairs of openings in the dorsal vessel as there are pairs of stigmata." *G: D.* (1582)

[**Doryphora** *decemlineata* reduces the starch-production of Coos co., N. H. to one-tenth what it formerly was.] (Springfield [Mass.] d. republican, 28 Nov. 1879, p. 6, col. 6, 2 cm.)
G: D. (1583)

Edwards, W: H: Ueber das Erziehen der Tagfalter aus Eiern. (Entom. Zeitung . . . zu Stettin, Oct.–Dec. 1879, jahrg. 40, p. 455–456.)

How to obtain eggs of butterflies for rearing.
G: D. (1584)

Eichhoff, W. Zur Entwicklungsgeschichte der Borkenkäfer [*scolytidae*]. (Entom. Zeitung . . . zu Stettin, Oct.–Dec. 1879, jahrg. 40, p. 501–506.)

On European species. *G: D.* (1585)

Engelmann, Th. W. Zur Anatomie und Physiologie der Spinndrüsen der Seidenraupe. (Zool. Anzeiger, 26 Aug. 1878, jahrg. 1, p. 100–102.)

According to researches made upon *bombyx mori* by Th. W. van Lidth de Jeude. *G: D.* (1586)

Fabre, J. H. Souvenirs entomologiques: Études sur l'instinct et les mœurs des insectes. Paris, C. Delagrave, 1879. t,-p. cover, [4 +] 324 p., 19 × 12, t 14 × 8.5. 3 fr. 50 c.

Biological observations and experiments upon different insects.

Contents: Le scarabée sacré, La volière, Le cerceris bupresticide, Le cerceris tuberculé, Un savant tueur, Le sphex à ailes jaunes, Les trois coups de poignard, La larve et la nymphe, Les hautes théories, Le sphex languedocien, Science de l'instinct, Ignorance de l'instinct, Une ascension au mont Ventoux, Les émigrants, Les ammophiles, Les bembex, La chasse aux diptères, Un parasite — le cocon, Retour au nid, Les chalicodomes, Expériences, Echange des nids, Notes (in which 4 new species of French hymenoptera are described). *G: D.* (1588)

Faucon, L. Expérience relative au transport des phylloxeras par le vent. Lettre à *M.* Dumas. (Comptes rendus, 8 Dec. 1879, v. 89, p. 983.)
G: D. (1589)

Fertilization of flowers by humming-birds. (Amer. nat., Feb. 1880, v. 14, p. 126–127.)

Observations in which bees do not appear to fertilize *impatiens fulva.* *G: D.* (1590)

Focke, W. O. Tabak und Hummeln. (Kosmos [Leipzig], March 1880, Bd. 6, p. 473–474, 46 cm.)

Bombus lapidarius learned to pierce the flowers of a hybrid between *nicotia rustica* and *n. paniculata,* in order to obtain the honey. *G: D.* (1587)

Fremy, Edmond. Questions relatives au phylloxera, addressées à *M.* P. Thenard. (Comptes rendus, 1 Dec. 1879, v. 89, p. 924–926.)

Upon the use of carbon disulphide [CS_2]. See A. P. E. Thenard's "Réponse aux questions de M. Fremy . . ." [Psyche, Rec., no. 1623]. *G: D.* (1591)

French, G: Hazen. Economic entomology of Illinois. Part 2. *Lepidoptera,* or butterflies and moths, and their larva, or caterpillars. (7th rept. state entomologist Ill., for 1877, 1878, p. 133–273, fig. 32–48.)

Describes about 115 species in most of their principal stages of development, treating of the habits of the more prominent species, and of remedies for their ravages. Gives (p. 269–273) analytical tables of the families and genera represented in this paper. *B: P. M.* (1592)

French, G: Hazen. Report of the curator of the museum. (5th annual rept. of principal to board of trustees of Southern Ill. normal university, 1879, p. 25–42.)

Separate, with t.-p. cover, entitled, "Report of the curator." Carbondale, Ill., 1879, p. 25–42, 21 × 13.

Report upon work done in and of additions to the museum during the past year; analytical tables of the butterflies of Illinois, distinguishing 4 families, 36 genera and 113 species.
B: P. M. (1593)

French, G: Hazen, *see* Thomas, Cyrus, *and* G: Hazen French, Notes on corn insects, . . . [Psyche, Rec., no. 1624].

Gerhard, Bernhard. Systematisches Verzeichniss der Macro-lepidopteren von Nord-Amerika. Leipzig, 1878. 16 + 196 p., 20 × 13, t 15.5 × 9. Pap., M. 4.50.

Crit. rev., by H. A. Hagen, entitled "Gerhard's . . . Amerika." (Entom. Zeitung . . . zu Stettin, Oct.–Dec. 1879, Jahrg. 40, p. 475–476.)

List with authorities, synonyms, and, in part, habitats of the species. Index of species and of genera. Reviewed in Psyche, April 1880, v. 3, p. 54. *G: D.* (1594)

[**Glossina** *morsitans*, the tsetse fly, cannot kill elephants.] (Springfield [Mass.] d. republican, 16 Dec. 1879, p. 5, col. 5, 3 cm.) *G: D.* (1595)

Graber, Vitus. Die abdominalen Tympanalorgane der Cikaden und Grylloden. (Denkschriften d. kais. Akad. d. Wissensch., math.-naturwissensch. Classe, 1876, bd. 36, p. 273–296, 2 pl.)

Separate, with t.-p. cover and t.-p., Wien, K. Gerold, 1876, 24 p., 2 pl., 30 × 25, t 23 × 17.2.)

Chiefly anatomical. *G: D.* (1596)

Greene, J. W. Bees eaten by shrew, *sorex*. (Amer. bee journ., 1879, v. 15, p. 108.)

The small shrews enter the hives and eat the bees. *A. J: C.* (1597)

Hagen, Hermann August. Troublesome insects. The carpet beetle and other domestic pests. An interesting communication to the Boston society of natural history [18 Dec. 1878]. (Boston d. advertiser, 19 Dec. 1878, no. 21940, v. 132, no. 147, p. 1, col. 9–10, 103 cm.)

Ravages and migrations of *Anthrenus scrophulariae;* means against it. Abundance of *Pulex irritans*. Migrations of insects and plants. *B: P. M.* (1598)

Hagen, Hermann August. Hoehlen-Chelifer in Nord-America. (Zool. Anzeiger, 28 July 1879, jahrg. 2, p. 399–400.)

Notes on *chthonius* without eyes, with one pair of eyes and with two pairs of eyes; *chelifer* parasitic under the elytra of *alaus*, *acanthocinus*, *passalus*, and on the legs of flies; the groups of the *chernetidae*. *G: D.* (1599)

Hagen, Hermann August. Gerhard's syst. Verzeichniss der Macrolepidopteren von Nord Amerika. (Entom. Zeitung . . . zu Stettin, Oct.–Dec. 1879, Jahrg. 40, p. 475–476.)

A crit. rev. of the above named work [Psyche, Rec., no. 1594]. *G: D.* (1600)

Hogarty, W. G. Do bees injure fruit? (Amer. bee journ., 1879, v. 15, p. 314.)

The answer is no. Many authors are quoted, and much experimental evidence given. *A. J: C.* (1601)

Hopffer, Carl [Heinrich]. Exotische Schmetterlinge. (Entom. Zeitung . . . zu Stettin, Oct.–Dec. 1879, jahrg. 40, p. 413–454.)

Mostly on South American species. Note (p. 435) on distribution of *agraulis vanillae*. *G: D.* (1602)

Illinois — *State entomologist* [1877 (*Cyrus Thomas*)]. 7th report . . . on the noxious and beneficial insects of the state of Illinois. 2d annual report by Cyrus Thomas. Springfield, Ill., 1878, 290 p., 23 × 14, t 18 × 10.5, 48 fig.

Rev., entitled, "Thomas' Noxious insects of Illinois." (Amer. nat., Jan. 1879, v. 13, p. 34.)

General annual account (p. 3–14) of the more important insects noticed; statistics of the value of birds as destroyers of insects, and of the injury done to the corn crop by insects. Table of contents (p. 274). Errata and corrigenda (p. 275). List of illustrations (p. 276). Index to the plants and other substances injured by insects mentioned in this report (p. 277–283). General index (p. 284–290). Contains the following distinct essays, *q. v.*

Thomas, Cyrus *and* G: Hazen French,. Notes on corn insects, or insects injurious to indian corn (p. 15–106, fig. 1–23) [Psyche, Rec., no. 1624].

Smith, *Miss* Emma A. Report (p. 107–131, fig. 24–31) [Psyche, Rec., no. 1622].

French, G: Hazen. Economic entomology of Illinois. Part 2. *Lepidoptera*, . . . (p. 133–273, fig. 32–48) [Psyche, Rec., no. 1592]. *B: P. M.* (1603)

Illinois, *state of — Department of agriculture.* Transactions . . . with reports from county agricultural boards, for . . .1877. Ed. by S. D. Fisher, secretary. Vol. 15, old s.; vol. 7, n. s. Springfield, Ill., 1878. [4] + 420 + 6 p., 23 × 14, t 18 × 10.5., il.

Announces (p. 9) the proposed publication by Cyrus Thomas of a treatise upon insects injurious to agriculture; contains (p. 16, 19) resolutions adopted by the state board of agriculture with reference to the collections and the reports of the state entomologist, and (p. 78, 131, 221) statistics of the representation of entomology at the annual state and other fairs. For other contents, see Illinois — *State board of agriculture*, "Report of museum committee" [Psyche, Rec., no. 1605], and Colman, A. R., "Premium essay on the diseases of swine" [Psyche, Rec., no. 1567]. The 7th rept. of the state entomologist, by Cyrus Thomas, is bound with these transactions in one volume. *B: P. M.* (1604)

Illinois — *State board of agriculture.* Report of museum committee [D. B. Gillham, H. D. Emery, S. D. Fisher]. (Trans. dept. agric. state of Ill. for 1877, 1878, v. 15, [n. s., v. 7,] p. 96–111.)

List of 1782 insects of 368 species, sent by Cyrus Thomas, state entomologist, to state board of agriculture, and placed on exhibition in 60 cases in the museum of the board at Springfield, Ill. *B: P. M.* (1605)

Insect borer in powder barrels (An.) (Amer. nat., April 1879, v. 13, p. 262.)

Larva of *callidium variabile* bores the hoops of powder barrels. *G: D.* (1606)

Italian silk. (Journ. applied sci., Oct. 1879, v 10, p. 149, 14 cm.)

Statistics of silkworm raising and silk manufacture in Milan. *G: D.* (1607)

Juice of the tomato-plant [*lycopersicum esculentum*] as an insecticide (The). ("Gardener's chronicle," . . .) (Springfield [Mass.] d. republican, 30 Sept. 1879, p. 3, col. 2, 5 cm.) *G: D.* (1608)

Kadyi, Heinrich. Beitrag zur Kenntnis [*sic*] der Vorgänge beim Eierlegen der *blatta orientalis.* (Zool. Anzeiger, 15 Dec., jahrg. 2, p. 632–636.)
G: D. (1609)

Katter, F. Index entomologicus. Pars I, qua continentur nomina entomologicorum Europae exceptis Galliae coleopterologis, societarum auctorumque entomologicorum. Putbus a. Rügen, A. Dose, 1880. t.-p. cover, [4 +] 124 p., 16 × 11.5, t 13 × 7.7. Pam., M. 1.60.
Contains the names of 73 American entomological collectors desiring exchange, extracted from the *Naturalists' directory* [ed. 1878], and a list of entomological societies and publications from all parts of the world. Reviewed in PSYCHE, April 1880, v. 3, p. 54. *G: D.* (1610)

Kraatz, Gustav. Ein Wort gegen die Vermehrung des Ballastes der Synonymie. (Entom. Zeitung . . . zu Stettin, Oct.–Dec. 1879, jahrg. 40, p. 506–508.)
G: D. (1611)

Kramer, P. Ueber die postembryonale Entwicklung bei der Milbengattung *glyciphagus.* (Archiv f. Naturgeschichte, 1880, jahrg. 46, bd. 1, p. 102–110, pl. 7.)
G: D. (1612)

Krauss, Hermann. Otocystenartiges Organ bei *tabanus autumnalis* Linné. (Zool. Anzeiger, 5 May 1879, jahrg. 2, p. 229–230.)
G: D. (1613)

Landerer, Xaver. Miscellaneous contributions from the Orient. (New remedies, Oct. 1879, v. 8, p. 293–294, 30 cm.)
Directs use of tobacco decoction with fresh leaves and flowers of *nerium oleander* as a bug poison. [5 cm.]
G: D. (1614)

Lichtenstein, Jules. Les pucerons des ormeaux, avec description de deux insectes nouveaux. (Feuille des jeunes naturalistes, Nov. 1879, p. 6–9; Dec. 1879, p. 22–24.)
Synopses of the species of *aphidae* and *coccidae* found on *ulmus campestris,* with notes on their biology. Describes *pemphigus ulmi* and *ritsemia pupifera.* *G: D.* (1615)

Lockwood, S: A viviparous fly. (Amer. nat., April 1873, v. 7, p. 193–197, fig. 34–35.)
Larvae of *sarcophaga carnaria,* experiments upon their vitality in turpentine, in Fowler's arsenical solution and in essence of peppermint. Figures larva, pupa and imago.
G: D. (1616)

Lombard, F. Destruction des acarus et des anthrènes. (Feuilles des jeunes naturalistes, Jan. 1880, ann. 10, p. 39.)
Employment of carbon disulphide [CS_2] in collections, to destroy *acarus* and *anthrenus.* *G: D.* (1617)

MacLeod, Jules. Phosphorescence des myriapodes. (Feuille des jeunes naturalistes, Jan. 1880, p. 38.)
Phosphorescence of *geophilus electricus.* *G: D.* (1618)

MacLeod, Jules. La respiration chez les insectes. (Feuille des jeunes naturalistes, Oct. 1879, ann. 9, p. 148–150.)
A brief account of the respiratory system of insects; how to study it by dissection of *dytiscus;* mechanism of respiration. *G: D.* (1619)

Machenhauer, F. Präparation der Libellen für Sammlungen. (Entom. Zeitung . . . zu Stettin, Oct.–Dec. 1879, jahrg. 40, p. 539.)
Mode of preservation in alcohol. *G: D.* (1620)

Oviposition of the queen bee [*apis mellifica*] and Dzierzon's theory (The). (Amer. nat., April 1879, v. 13, p. 260–261.)
Crit. rev., by A. J: Cook, entitled, "Parthenogenesis in the honey bee." (Amer. nat., June 1879, v. 13, p. 393–394.)
Quotation from *Comptes rendus,* 9 Sept. 1878, p. 408.
G: D. (1621)

Smith, *Miss* Emma A. Report. (7th rept. state entomologist Ill., for 1877, 1878, p. 107–131, fig. 24–31.)
Observations made upon noxious insects of northern Illinois, during the summer of 1877. Treats especially of *emphytus maculatus, gortyna nitela, argyrolepia quercifoliana* and *lecanium acericola.* *B: P. M.* (1622)

Thenard, Arnould Paul Edmond. Réponse aux questions de *M.* Fremy relatives à l'emploi du sulfure de carbone [CS_2] appliqué à la destruction du phylloxera. (Comptes rendus, 1 Dec. 1879, v. 89, p. 926–931.)
Extract. (Rev. scientifique, 13 Dec. 1879, p. 573, 12 cm.)
Reply to E. Fremy's "Questions relatives au phylloxera . . ." [PSYCHE, Rec., no. 1591]. *G: D.* (1623)

Thomas, Cyrus *and* G: Hazen French. Notes on corn insects, or insects injurious to indian corn. (7th rept. state entomologist Ill., for 1877, 1878, p. 15–106, 23 fig.)
P. 15–78, fig. 1–18, by Thomas, treats of the coleoptera, orthoptera and hemiptera, especially of *blissus leucopterus;* p. 79–106, fig. 19–23, by French, treats of the lepidoptera.
B: P. M. (1624)

Thomas, Cyrus, *state entomologist of Illinois, see* ILLINOIS, — *State entomologist* [1877].

Trelease, W: On the fertilization of several species of *lobelia.* (Amer. nat., July 1879, v. 13, p. 427–432, il.)
Mention of species of insects visiting species of *lobelia.*
G: D. (1625)

Voges, Ernst. Beiträge zur Kenntniss der Juliden. (Zeitsch. f. wissensch. Zool., 1878, v. 31, p. 127–194, pl. 11–13.)
Structure of the hard parts, openings of the tracheal system and their muscles, comparison of these openings with those of other myriapods, glandular apparatus and its secretion in *spirobolus cupulifer* (new species), copulatory organs and their form as generic and specific characters. Describes 3 new species of *julus,* 19 of *spirostreptus,* 13 of *spirobolus;* none from N. A. *G: D.* (1626)

Wackerzapp, Omar. Weiteres zur Begattung der Schmetterlinge. (Entom. Nachrichten, 15 Jan. 1880, jahrg. 6, p. 15–17.)
Copulation of *aglia tau* and the attraction of the female for the male. *G: D.* (1627)

Weismann, August. Ueber Duftschuppen. (Zool. Anzeiger, 26 Aug. 1878, jahrg. 1, p. 98–99.)
Scent-cells and scales of wings of lepidoptera.
G: D. (1628)

ENTOMOLOGICAL ITEMS.

"London Purple," according to Prof. C: V. Riley, can be sold for ten cents per pound. Half a pound will kill the cotton worm on one acre of land.

A. Dubrony, author of the "Essai sur le genre *Chelidura*" and "Enumeration des orthoptères rapportés par MM. Doria, Beccai, et d'Albertis des régions Indienne et Austro-Malaise," published in the Annali del Museo Civico di Storia Naturale di Genova, will hereafter publish (he writes me) under his own name, A. de Bormans. — *S. H. S.* in *Lib. Journ.*, Dec. 1879, v. 4, p. 457.

"In closing upon this subject, I desire to acknowledge the very generous offer of our State Entomologist, Hon. Cyrus Thomas, of Carbondale, of an entomological treatise upon the insects injurious to agriculture, stripped of all technical phrases, and, hence, adapted to the uses of the common people. In my judgment, a paper of the character proposed, has for many years been especially needed, as the reports hitherto published on that subject have been couched in language beyond the comprehension of the average farmer or fruit grower. It would be well for the Board to take some action with regard to its publication in our next volume of reports." — *Pres. D. B. Gillham,* in *Trans. dept. agric. Ill., for* 1877, 1878, v. 15, [n. s., v. 7,] p. 9.

An opportunity for scientists. — Lord Walsingham and other gentlemen interested in the disease of game-birds has [have] authorized the Entomological Society of London to offer to public competition the following prizes: $250 for the best and most complete life-history of *Sclerostoma syngamus*, Dies., supposed to produce the so-called "gapes" in poultry, game, and other birds; and $250 for the best and most complete life-history of *Strongilus pergracilis*, Cob., supposed to produce disease in grouse. All the stages of development must be observed and recorded. The competition is open to scientists of all nations. One person can take both prizes. The essays must be sent in by October 15, 1882, addressed to the secretary of the Society, 11 Chandos street, Cavendish Square [London, Eng.]. — *J. M.*, in *New England Journ. of Educ.*, 30 Oct. 1879, v. 10, p. 242.[23]

SOCIETY MEETINGS.

The regular meetings of the Cambridge Entomological Club will be held at 19 Follen St., at 7.45 p. m., on the days following: —

9 Jan. 1880.
13 Feb. „
12 Mar. „
9 April 1880.
14 May „
11 June „

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following: —

28 Jan. 1880.
25 Feb. „
24 Mar. „
26 Apr. 1880.
26 May „

B: Pickman Mann, *Secretary.*

The annual meetings of the Entomological Section of the American Association for the Advancement of Science will begin at 2 p. m., on Tuesday, 24 Aug. 1880, at a place yet to be determined, in Boston, Mass. Members who intend to present communications that may provoke discussion are requested to allow the Secretary to announce their subjects, in order that other members may come ready to enter into a thorough discussion.

B: Pickman Mann, *Secretary,*
Cambridge, Mass.

The regular meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following: —

9 Jan. 1880.
13 Feb. „
12 Mar. „
9 Apr. 1880.
14 May „
11 June „

James H. Ridings,
Recorder.

The semi-annual meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following: —

8 Dec. 1879.
14 June 1880.

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NOTES UPON SOME TINEID LARVAE.

BY VACTOR TOUSEY CHAMBERS, COVINGTON, KY.

Antispila nyssaefoliella and *A. cornifoliella.*

I have had specimens of the imagos of both of these species in my collections, but not at the same time, and therefore have not been able to compare them. Dr. Clemens notices some minute differences between them, but seems to rely more upon supposed differences in the maculation of the larvae as indicating their specific distinction. But these characters are not altogether reliable; for the number and distinctness of the maculae differ in the same individual at different ages, the number increasing with the age of the larva until it reaches the last larval stage. At least, this is the case with *nyssaefoliella*, of which Dr. Clemens says, " dark atoms along the dorsum; ventral surface with a line of two black spots," though just what " a line of two black spots " may mean, I do not know. In a specimen now before me there are nine blackish spots behind the cervical shield on the dorsal surface, and twelve on the ventral surface. Dr. Clemens further says that " after the last moulting the first segment is black, and the dorsal spots become a black vascular line," which is certainly incorrect; for in its last larval stage, when taken from its cocoon, I have found the larva to be depressed, fat, snowy white with the mouth parts tinged with ferruginous, but the larva otherwise immaculate. It has a single black ocellus about the middle of each side of the head. The larvae of this genus are completely apodal, and in the youngest larvae that I have seen the larval trophi were fully developed; that is, they were equivalent to the second form of trophi of larvae of *Lithocolletis*, *Phyllocnistis*, &c.; and I think the larvae leave the egg in this stage of development, without passing through what I have elsewhere mentioned as the first form of trophi of the genera above named.

I have never found more than two exuviae in an *Antispila* mine, and am not certain as to the number of moults before passing into the pupa state; it is probably not more than two.

The larva of *A. viticordifoliella* in its last stage is, like that of *nyssaefoliella*, immaculate; but it is yellowish white, and not snowy white like the latter. These larvae crawl but little if at all, after cutting out their discs. Indeed, from their structure, locomotion would seem to be impossible, or nearly so.

Aspidisca lucifluella Clem.

I have succeeded in raising this species from the larva, and find, as elsewhere suggested, that the captured specimens described by me as *A. ella* belong to this species.

The larvae of *Aspidisca*, as stated by Dr. Clemens, are apodal, having the thoracic feet represented by sucker-like discs. I have not been able as yet to determine whether these discs really operate as suckers, or whether there is a secretion exuded from them which enables the larvae to adhere to the surface. The anal prolegs are represented by small lobes, each of which has a recurved hook, by means of which the larva anchors itself inside of its case, which, notwithstanding the absence of legs, and depending only on the "suckers," it drags through grass, and over fences, sometimes for more than a hundred metres, before "tying up" for pupation. These anal hooks are much more distinctly developed in *A. splendoriferella* and *A. lucifluella*, than in *A. saliciella*.

I have never been able to detect any trace of the exuviae in the mines of any of the species, and am induced to believe that the larva moults only once — that is, when it passes into the pupa state. In the youngest larvae that I have seen, the trophi are of the character above referred to under *Antispila* as the second or perfect form.

I have elsewhere followed a suggestion of Mr. Stainton in referring both *Antispila* and *Aspidisca* to the *Glyphipterygides*, but the larvae differ very decidedly from those of *Glyphipteryx*, and those of *Aspidisca* are very different in form and structure from those of *Antispila*. Dr. Clemens' statement that the mature larvae of *Aspidisca* are flattened, is too strong; at most they can only be said to be a little depressed, and are much less so than are the larvae of *Antispila*. His statement, "these are not supplied with hooks," is rather indefinite, but if intended to apply to the anal prolegs of mature larvae is certainly incorrect, though entirely correct when applied to the ventral prolegs, or rather to their sucker-like substitutes.

Aeaea (*Chrysopeleia*) *purpuriella*.

Among leaves of the black locust (*Robinia pseudacacia*), gathered because they contained mines of *Lithocolletis robiniella*, in July, several were observed in which there appeared to be either small white mines, or thin white silken webs at the junction of some of the veins with the midrib, each of which contained a small larva. But neither the mines nor larvae received anything more than a passing notice, as my attention was directed to watching the development of the larva of *L. robiniella*. But from the collection I bred a specimen of *A. purpuriella*, the larva of which has been heretofore unknown. I can scarcely doubt that it came from one of the larvae in the small mines, as I got nothing else from those leaves but *A. purpuriella* and *L. robiniella;* and the position of the mine (or web?) is exactly that of the mine of *Aeaea ostryaeella* in *Ostrya* leaves (see frontispiece to "Tineina of North America"), though it is much smaller than the latter. At the same time, it should be stated, the web of the very young larva of *Gelechia pseudacaciella* is only distinguishable, on a hasty glance, from the supposed mines of *Aeaea purpuriella*, by the fact that a very slender branch extends from the main web for some distance along the midrib, in the case of *G. pseudacaciella*, which also feeds on locust leaves. At any rate, the specimen of *A. purpuriella* was certainly bred from locust leaves, whatever be its mode of feeding thereon.

Coleophora.

A species of this genus which I have not succeeded in rearing, mines the leaves of elm (*Ulmus americana*), sometimes in large numbers. All of the larval cases that I observed had been cut out from the edge of the leaf, showing the serrations along the dorsal surface of the case; yet it was frequently found in these cases feeding generally over the under surface of the leaves. It must therefore retire to the edge of the leaf to feed shortly before changing its case.

Gelechia pseudacaciella.

In the note on *Aeaea purpuriella* above, I have referred to the web of the very young larva of this species as being very similar to the web (or mine?) of *A. purpuriella;* being placed like it at the junction of a vein with the midrib, but differing from it by having a narrow strip of web extending along the midrib. But *G. pseudacaciella* does not continue long to feed in this way. It may afterwards be found — sometimes when nearly grown — feeding between two of the leaflets sewed together; but much more frequently it may be found in the mines of *Lithocolletis robiniella*, and more rarely in those of *Lithocolletis ornatella.* I have sometimes seen it deliberately cut its way into the mines of *L. robiniella;* and when there it does not confine itself to a vegetable diet, for I have opened the mines and *found the larva in the act of eating the pupa of its host.* I do not know that it eats the larva of *L. robiniella*, though from the frequency of the occurrence of *G. pseudacaciella* in mines of *L. robiniella* from which the latter larva was absent, I suspect that it does. Possibly the struggles of the *L. robiniella* larva might drive that of *G. pseudacaciella* away; but I know that the pupa is eaten, having seen it.

I have never found the larva of *G. pseudacaciella* except on locust trees; but Prof. Riley once showed me two specimens of a *Gelechia* moth which I was unable to distinguish from *G. pseudacaciella*, and which Mr. Riley said he had bred from larvae found on wild cherry (*Prunus serotina*). It is not likely that the larva feeds on two plants so remote from each other as locust and wild cherry; but a larva which varies its diet of locust leaves by an occasional repast on the living pupa of a *Lithocolletis*, need not be supposed to be excessively fastidious.

The only difference that I have observed between the very young and the mature larvae of *G. pseudacaciella* is that the markings are more prominent in the latter.

There is a larva of an unknown species and genus which burrows in June and July in the pith of the preceding year's shoots of *Robinia pseudacacia.* The markings and form of the ventral segments are not very different from those of *G. pseudacaciella* but the head and thoracic segments are enlarged and are of a black or piceous hue, and the mouth parts are large and strong, as becomes a burrowing larva. It has sixteen well developed legs and prolegs. It probably will form the type of a new genus. It can hardly be the unknown larva of *Xylesthia clemensella*, for that larva feeds in the solid wood of locust posts and trees, and therefore probably does not feed on the pith of living branches.

Gracilaria negundella.

This species has heretofore been recorded only from Denver, Colorado; but I have also found the leaves of the box alder its food plant, in Kentucky, rolled into cases precisely similar to those made by this species in Colorado, and containing a *Gracilaria* larva, of which, however, I did not succeed in rearing the imago. I have, however, no doubt that it is the same species.

Laverna gleditschiaeella.

The egg of this species (which I have found only by dissection of the female) is a very pretty microscopic object. It is opaque; the centre of the larger end projects a short distance, and ridges extend on every side from the projection to the margin, with concave valleys between them, and these ridges and valleys are continued along the surface towards the smaller end of the egg, but grow gradually more indistinct; they are not straight, but have a wavy outline. The egg is depressed and narrows gradually towards the smaller end, which is somewhat sharply and suddenly rounded: color, white.

The eggs of *Argyresthia undulatella* Cham., which I have obtained in the same way, resemble microscopic hen's-eggs, except that they are a little more globular.

Nepticula nyssaefoliella n. sp.

Only the larva is known, as I have not yet succeeded in getting the imago. The larva is greenish white with deep green contents; head pale ferruginous with the mouth-parts of a deeper green; the mine is linear, ending in a brownish yellow blotch, and the frass is attached to the loosened upper cuticle. No exuviae were found in the mine, and this larva, like most larvae of this genus, undergoes no moult until pupation. I believe, however, one or two instances have been recorded of moults of larvae of this genus in Europe. But usually the entire larval life does not exceed thirty-six hours.

There is a larva of this genus which is not uncommon in hickory leaves (*Carya alba*), in which it makes a large blotch mine. The larva itself is rather large for the genus, but I have not succeeded in rearing the imago. Another hickory *Nepticula* which I have not succeeded in rearing, makes a linear mine about 2,5 cm. long, in the first and last fourths of which the frass is deposited in a central line, while in the middle portion it is deposited in transverse rows of small specks, somewhat as in the mine of the European *N. viscerella.*

Nepticula quercicastanella Cham., heretofore bred from leaves of the chestnut oak (*Quercus castanea*), I have also bred from leaves of the white oak (*Q. alba*).

N. castaneaefoliella Cham., heretofore bred from chestnut leaves (*Castanea*), I have also bred from the leaves of white oak.

Dr. Clemens (*Tin. N. Amer.*, p. 172–), mentions several other *Nepticula* larvae which have not as yet been bred, and besides these there is a species which makes a long crooked linear mine in leaves of the sugar maple (*Acer saccharinum*); another in leaves of sumac (*Rhus*); another in elm leaves (*Ulmus*), and many others; in fact we know comparatively little yet of the *Nepticula* of this country. There is also a species mining leaves of hackberry (*Celtis*).

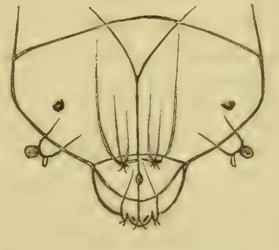
Ornix prunivorella Cham.

This species, and probably most or all other species of the genus, like those of *Gracilaria*, to which it is so closely allied, assume what I have called the second form of larval trophi at the second moult.

Phyllocnistis.

In a paper in Psyche on *Lithocolletis*, I incidentally mentioned the presence in *Phyllocnistis* of certain projections from the sides of certain segments of the larva, which, though not occupying the places usually occupied by legs, and perhaps not homologous therewith, yet served, to some extent at least, the same purpose, and so I questioned the propriety of describing *Phyllocnistis* larvae as apodal. I was therefore greatly surprised, on the next occasion when I observed larvae of this genus, that I could find no trace whatever of these pseudopodia; then again in others I would find them — sometimes the full complement, at others only a part, and sometimes in the same specimen I would find them and then fail again. The fact is that they are retractile.

I formerly thought (Psyche, *loc. cit.*), from analogy with *Lithocolletis* larvae that there were seven stages of larval life in *Phyllocnistis*, but I have not been able to verify this belief. On the contrary, I find only two stages. The mines are long winding linear tracts, ending in a *small* blotch, which, however, remains a blotch only a very short time; only, indeed, while the larva is spinning its cocoon, which draws the blotch into a small knot, or pucker. The linear part of the mine is occupied by the larva in its first stage; at least I have not been able to find any evidence of a moult while the mine remains linear. The form of the trophi is then very similar to that of the earlier stages of *Lithocolletis* larvae (see Psyche, v. 2, p. 83, fig. 2). Having nearly finished feeding, the larva eats out the parenchyma next to the upper cuticle, making a small blotch. Although the rudimentary spinneret is visible, the silk is not yet secreted, and the larva cannot spin; but resting quietly in the little blotch for a few hours, it then casts off the old skin and appears no longer a flattened larva with the first form of trophi, but is simply depressed, nearly cylindrical, and with the trophi as in the accompanying figure.



These trophi are evidently not intended for use in eating, and in fact the larva does not eat any more; it becomes rapidly cylindrical (or rather oblong conic, for it tapers rapidly posteriorly). The pseudopodia are still visible, and the larva when removed from its cocoon "bumps around" on these stubs of legs, in a rather ridiculous manner. The spinneret and silk glands are now fully developed; the larva quickly spins its cocoon, and in little more than a day after this moult it passes its second moult, and becomes a pupa.

I find no material difference in the course of development in any of the species *ampelopsiella*, *vitigenella*, *vitifoliella* and *magnoliaeella*. The latter species is known only in the larval and pupal states, and is probably identical with *liriodendronella*.

Tischeria.

In all of the species of this genus of which I have traced the life history (*T. malifoliella*, *T. quercivorella* and *T. quercitella*), there are the same number of moults as in the greater number of lepidoptera, viz., four (or five, if we include the moult into the pupal state); and there are no marked differences, either in color or structure, between the same larvae at different stages of growth. The oak-feeding species are more readily distinguished from each other by the character of the mines, than by the appearance of either the larva or imago. Mr. Stainton's figure of *T. marginea* (*Nat. Hist. Tin.*, v. 3, plate), is very much like the larva of our *T. malifoliella*, but the head of *marginea*, as figured, is darker than that of *malifoliella*, and the last three segments, especially the last one, in the figure, are too short and narrow. The wings of the imago of *marginea*, as figured, are paler than those of *malifoliella.* The larva of *malifoliella* is also slenderer than that of *marginea*, and more moniliform, while each segment has on each side three hairs, which are not represented in the figure of *marginea*. *Marginea* is *perhaps* nearer — or as near — our *T. aenia* F. & B., which, like *marginea*, mines bramble leaves. The mine of *marginea* is, however, wider and more irregular than that of *aenia*.

TRANSFORMATIONS OF *NACERDES MELANURA.*

BY HENRY LORING MOODY, MALDEN, MASS.

As far as I am aware, nothing is yet known of the transformations of this very common beetle. At various times I have hunted assiduously for the larva, but without success. Thinking better luck might follow from trying to obtain larvae in another way, I captured a lot of the beetles with the purpose of getting the eggs. From the fact that the beetles are abundant about buildings with open rafters, I concluded that dry pine wood was the food of the larva, and confined the females in a vessel with a quantity of dry "punky" pine. They laid their eggs freely, and in eight days the young appeared; when first hatched they measured a fraction over one mm. long. At intervals of one or two weeks I measured specimens, and, singularly enough, though apparently in good health, their growth after the first few days was hardly perceptible. At the end of seven months the largest specimens measured barely more than two mm. long; in eleven months four mm., and at the beginning of the fifteenth month all were dead. It would be somewhat remarkable for any larva to sustain life so long under conditions altogether unfavorable. I am confirmed therefore in thinking that pine, or some one of the coniferous woods, in a dry state, is the food of this larva, but think I made a mistake in keeping the vessel so tightly closed as to exclude the air.

The eggs of *Nacerdes* are cylindrical, a fraction over 1 mm. long, a little more than three times as long as their greatest breadth, tapering somewhat toward each end, sometimes slightly curved, rounded at the ends. Color white, somewhat translucent, with a portion at each end semi-transparent.

PSYCHE.

CAMBRIDGE, MASS., MAY 1880.

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PROCEEDINGS OF SOCIETIES.

LINNEAN SOCIETY OF LONDON.

5 FEB. 1880. — . . . Mr. A. Hammond exhibited a larva of *Tanypus maculatus.* He mentioned that the coronet and appendages of the thoracic and anal regions had been said to be homologous with the respiratory organs of the larva and pupa of gnats, &c. This he doubted, inasmuch as the former originated from the ventral and not dorsal surface, as did the latter, and no tracheae of any size could be traced in them. The two oval bodies in the thorax, De Geer's so-called "air reservoirs," he (Mr. Hammond) considers to be salivary glands, similar to those of the larva of the Crane Fly previously described by him. . . . — *The Athenaeum*, 14 Feb. 1880, p. 220.

19 FEB. 1880. — Specimens of ants, allied to if not identical with *Pheidole javana* Mayr, were shown by Mr. Jas. Britten, as also a series of young and old plants sent by Mr. H. O. Forbes from Borneo, viz: *Myrmecodia echinata* and *M. glabra.* The underground stems of these latter all exhibited tunneled galleries not unlike the borings of the white ant Termites. These chambered stem enlargements illustrate a statement of Sig. Beccari that the plants' existence is essentially bound up with the ants', for unless the latter attack the young growing *Myrmecodiae*, the latter soon die. — Another piece of ants' work was shown by Dr. M. Musters, viz: a pitcher plant, *Nepenthes bicalcarata*, also from Borneo. It seems these peculiar pitchers, from having incurved spinous ridges round their throats, are perfect traps to creeping insects. To take advantage of the contained food and water, a species of black ant, too wise to enter by the lid, ingeniously perforates the stalk, and making a passage upwards, provides a safe inroad and exit to the sumptuous fare of dead and decaying insects within the pitcher. . . . — *J. Murie* in *Zool. Anzeiger*, 22 March 1880, p. 143-144.

ENTOMOLOGICAL SOCIETY OF ONTARIO — MONTREAL BRANCH.

17 MAY 1880. — *7th annual meeting.* — The following persons were elected to office for the ensuing year: G: J: Bowles, *President;* G: B. Pearson, *jr., Vice-president;* G: H. Bowles, *Secretary;* Frank Butler Caulfield, *Curator;* H: Herbert Lyman, W: Couper, and Robert Jack, *Members of the Council.*

The annual report of the Council shows the society to be progressing favorably. A number of valuable works have been added to the library during the year, and the following papers have been read at the monthly meetings: —

1. "A description of the male *Alypia maccullochii*, Kirby." — W: Couper.
2. "Notes on a species of *Cossus* taken at Montreal." — Frank Butler Caulfield.
3. "The milk plant, its insect parasites, red and black in color." — W: Couper.
4. "How to preserve specimens of insects." — G: J: Bowles.
5. "On luminous insects." — G: H. Bowles.
6. "Montreal hymenoptera." — W: Couper.
7. "Notes on rearing lepidoptera." — H: Herbert Lyman.
8. "Some of the insects that frequent the orchard and garden," by *Rev.* F. W. Fyles. (*Selected.*) — G: J: Bowles.

Several tours were made by the members, during the summer, to the different collecting grounds in the vicinity of Montreal, with good results, a number of new species for our catalog being discovered.

Altogether, I am glad to say, our science is not being neglected here, though, perhaps, not receiving the attention it deserves, or would have were more time at our disposal.

G: H. BOWLES, *Secretary.*

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [ ], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

Corrections of errors and notices of omissions are solicited.

Dollfus, Adrien, *see* Association française pour l' avancement des sciences — *Congrès de Montpellier, Section de zoologie,* [Abstract of proceedings] [Psyche, Rec. no. 1488].

Fabre, J. H. Mœurs et parthénogénèse des *halictes.* (Comptes rendus, 22 Dec. 1879, v. 89, p. 1079–1081.)

Abstract. (Rev. scientifique, 3 Jan. 1880, p. 641, 6 cm.)

Observations chiefly made upon *h. lineolatus* and *h. sexcinctus.* *G: D.* (1629)

Fuller, Andrew S. Little-known silkworms. (Frank Leslie's popular monthly, Jan. 1880, v. 9, p. 99–100, 102, 7 fig., 63 cm.)

Figures *attacus cynthia,* larva, cocoon, imago; *a. yamamai,* larva, cocoon, imago; *a. pernyi,* cocoon, imago; *a. mylitta,* imago. *G: D.* (1630)

de **Graaf,** H. W. Beiträge zur Kenntnis des anatomischen Baues der Geschlechtsorgane bei den Phalangiden. (Zool. Anzeiger, 26 Jan. 1880, jahrg. 3, p. 42–43.)

Summary of results obtained by study of *phalangium cornutum, ph. parietinum* and *leiobunus rotundus.* *G: D.* (1631)

Mayer, Paolo [= Paul]. Sopra certi organi di senso nelle antenne dei ditteri. (Mem. reale accad. dei lincei, 1879, v. 3. . . .)

Separate, with t.-p. cover, Roma, 1879, 12 p., 30 × 12, t 21 × 13; 1 pl., 30 × 42, t 24 × 33.

Describes and figures the terminal joint of the antenna and the structure of its sense-organs, in *drosophila, eristalis tenax, sicus ferrugineus, syrphus balteatus, musca* (*domestica?*), *m. vomitoria* and *pulex irritans.* *G: D.* (1632)

Mayer, Paul. Die Verwendbarkeit der Cochenille in der microscopischen Technik. (Zool. Anzeiger, 9 Dec. 1878, jahrg. 1, p. 345–346.) *G: D.* (1633)

Metschnikoff, Elias. Zur Lehre über Insectenkrankheiten. (Zool. Anzeiger, 26 Jan. 1880, jahrg. 3, p. 44–47.)

Records results of infecting the larvae of species of coleoptera injurious to vegetation with the spores of an insecticidal fungus, here called *isaria destructor.* *G: D.* (1634)

Mivart, St. G. The geography of living creatures. (Contemporary rev., Feb. 1880, p. 275–299.)

Regions of distribution of plants and animals. A few notes on insect-distribution. *G: D.* (1635)

Müller, Fritz. Ueber Gerüche von Schmetterlingen. (Zool. Anzeiger, 15 July 1878, jahrg. 1, p. 32.)

Odor of *daptonoura lycimnii, callidryas trite,* and *didonis biblis* from Brazil. *G: D.* (1636)

Müller, Fritz. Mittheilungen über Phryganiden. (Zool. Anzeiger, 26 May 1879, jahrg. 2, p. 283–284.)

Chiefly upon the structure of the pupae of Brazilian *phryganidae.* *G: D.* (1637)

Müller, Fritz. Ueber Phryganiden. (Zool. Anzeiger, 27 Jan. 1879, jahrg. 2, p. 38–40.)

Larvae and larval cases of Brazilian *phryganidae.* *G: D.* (1638)

Müller, Fritz. Ueber Phryganiden. (Zool. Anzeiger, 7 April 1879, jahrg. 2, p. 180–182.)

Significance of the ciliate legs of pupae of some *phryganidae.* *G: D.* (1639)

Müller, Fritz. Ueber Phryganiden. (Zool. Anzeiger, 28 July 1879, jahrg. 2, p. 405–407.)

Systematical and biological notes. *G: D.* (1640)

Müller, Fritz. Ueber die Vortheile der Mimicry bei Schmetterlingen. (Zool. Anzeiger, 29 July 1878, jahrg. 1, p. 54–55.)

Considerations based upon mimicry among Brazilian lepidoptera. *G: D.* (1641)

Müller, Hermann. Die Insecten als unbewusste Blumenzüchter. (Zool. Anzeiger, 15 July 1878, jahrg. 1, p. 32–33.)

Mutual adaptability of certain flowers and insects. Error corrected (Zool. Anzeiger, 27 Jan. 1879, jahrg. 2, p. 41.) *G: D.* (1642)

Müller, Hermann. Ueber *numenia acontius.* Von Fritz Müller. (Zool. Anzeiger, 1 July 1878, jahrg. 1, p. 13–14.)

Considerations upon the sexual differences of this papilionid from Brazil. *G: D.* (1643)

Müller, Fritz, *see* Müller, Hermann, Ueber *numenia acontius* [Psyche, Rec., no. 1643].

Packard, Alpheus Spring, *jr.* The cotton-worm moth [*aletia argillacea*] in Rhode Island. (Amer. nat., Jan. 1880, v. 14, p. 53.) *G: D.* (1644)

Packard, Alpheus Spring, *jr.* Discovery of a tardigrade. (Amer. nat., Dec. 1873, v. 7, p. 740–741, fig. 181.)

Figures *macrobiotus americanus,* n. s., from New Gloucester, Me., and mentions another species of the genus from Iowa. *G: D.* (1645)

Popenoe, Edwin A. A list of Kansas coleoptera. (Trans. Kansas acad. sci., 1877, v. 5, p. 21–40.)

Enumerates "about 1200" species. *G: D.* (1646)

ENTOMOLOGICAL ITEMS.

The well-known entomological author, Karl Fritsch, of Salzburg, Austria, died 26 Dec. 1879, in his sixty-eighth year.

Three prizes, amounting to about 1800 dollars, have been offered by the Italian government for vineyards raised from grafts of those varieties of American grapes which are known to be capable of resisting the attacks of phylloxera.

According to an item in *Colonies and India*, a new disease, in the form of a minute tick, has sprung up in the vineyards of Cape Colony. The press of that region is, meanwhile, discussing measures to prevent the introduction of phylloxera into the colony.

Two eminent French lepidopterists died last December in Paris, Dr. Jean Alphonse Boisduval and Jean Étienne Berce. The latter, well-known as the author of "Les papillons de France," died the 29th, and the former, author of many works upon lepidoptera, died the next day.

The annual meeting of the Entomological Club of the American Association for the Advancement of Science will be held at the Museum of the Boston Society of Natural History, corner of Berkeley and Boylston Sts., Boston, commencing at 2 p. m., Tuesday, 24 Aug. 1880.

It is proposed to send to every member of the American Association, and to all others who may favor the undersigned with their address for that purpose, a circular announcing the special subjects which will be presented at this meeting of the Club; and therefore all entomologists who desire to read communications at that time are requested to notify one of the undersigned before August 1st. This will ensure a fuller discussion of the topics presented, and, it is hoped, a larger attendance.

There will be an informal social gathering of entomologists at the rooms of the Boston Society of Natural History, 24 Aug. 1880, from 10 a. m. to 1 p. m. During the meeting of the American Association a room will be constantly open for the exclusive use of the entomologists.

Samuel H. Scudder, *President*,
Cambridge, Mass.
B: Pickman Mann, *Secretary*,
Cambridge, Mass.

SOCIETY MEETINGS.

The regular meetings of the Cambridge Entomological Club will be held at 19 Follen St., at 7.45 p. m., on the days following: —

8 Oct. 1880.
12 Nov. „
10 Dec. „
14 Jan. 1881.
11 Feb. „
11 Mar. 1881.
8 Apr. „
13 May „
10 June „

B: Pickman Mann, *Secretary*.

The regular meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following: —

27 Oct. 1880.
24 Nov. „
22 Dec. „
26 Jan. 1881.
23 Feb. 1881.
23 Mar. „
27 Apr. „
25 May „

B: Pickman Mann, *Secretary*.

The regular meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following: —

8 Oct. 1880.
12 Nov. „
10 Dec. „
14 Jan. 1881.
11 Feb. „
11 Mar. 1881.
8 Apr. „
13 May „
10 June „

James H. Ridings, *Recorder*.

The semi-annual meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following: —

13 Dec. 1880.
13 June 1881.

James H. Ridings, *Recording Secretary*.

The regular monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following: —

6 July 1880.
3 Aug. „
7 Sept. 1880.
5 Oct. „

G: H. Bowles, *Secretary*.

PRIZE ESSAYS.

Due 15 Oct. 1882. — Life-histories of *Sclerostoma syngamus* and of *Strongilus pergracilis*. See Psyche, v. 3, p. 59.

ADVERTISEMENTS should reach the editors by the 10th of the month preceding the one in which they are to appear.

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No. 1. THE ENTOMOLOGICAL WRITINGS OF JOHN L. LECONTE. Compiled by Samuel Henshaw. Edited by George Dimmock. Nov. 1878. 11 p. t 19 × 12.5, Price, 30 cents; on 5 × 12.5 title-slips, $1.25.

No, 2. THE ENTOMOLOGICAL WRITINGS OF GEORGE H. HORN. Compiled by Samuel Henshaw. Edited by George Dimmock. Jan. 1879. 6 p. t 19 × 12.5. Price, 20 cents; on 5 × 12.5 title-slips, 50 cents.

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Address EDITORS OF PSYCHE,
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FOR SALE.

Synopsis of the N. A. species of *Platynus*, Bon., by J. L. Leconte, M. D. (with description of new species).

Reprint from Bulletin of the Brooklyn Ent. Soc., v. 2, Nov. 1879, p. 43–58. Price, 50 cts. Address Brooklyn Entomological Society, 9 Broadway, Brooklyn, N. Y.

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No. 72 was issued 28 May 1880.

PSYCHE,

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

[Established in 1874.]

EDITED BY

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Davenport, Iowa.

Vol. 3. No. 74.
JUNE 1880.

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PSYCHE.

EXPERIMENTS UPON THE EFFECT OF COLD APPLIED TO CHRYSALIDS OF BUTTERFLIES.

BY WILLIAM HENRY EDWARDS, COALBURGH, W. VA.

(*Concluded from p.* 19.)

Between 26 Feb. and 19 March 1880, there emerged, in my house, 10 examples of *Papilio ajax* from the chrysalids subjected to cold for 14 and 20 days in 1879, as related on page 4. From the lot iced 14 days emerged 2 ♂, 2 ♀; from that of 20 days, 4 ♂, 2 ♀.

From chrysalids of same laying of eggs, but which were not iced, emerged 4 ♂ 8 ♀ between 4 March and 30 March. Eight of the ten iced chrysalids gave butterflies before 2 March, and therefore 2 days before any had come from the not iced lot. The other two emerged on 18 and 19 March.

On 4 April, I examined all these butterflies and compared them with each other, and also with examples from same lot of eggs, the chrysalids of which had been iced and gave butterflies in 1879.

1. Comparing with each other: all are *telamonides*. I found no difference in shape or coloration, between the examples iced and not iced.

2. Comparing with examples from same lot of eggs, which emerged in 1879: these latter have the summer form (*marcellus*) with the coloration of the winter form (*telamonides*), wherever the change is complete; and any change at all is in the direction of the winter form (p. 5, 6). The wings are all produced, the hind margins of primaries concave; the tails very long, averaging ♂ 23.5 mm., ♀ 24.1 mm.

The butterflies of 1880 have the wings much less produced, the hind margins straight or convex; the tails short, averaging, ♂ 18.1 mm., ♀ 20.3 mm.

The icing apparently produced no effect on the chrysalids which passed the winter, except perhaps to hasten the appearance of the butterflies a few days. But the same treatment altered the markings of the butterflies which emerged in 1879.

It does not appear that the effect of the cold was really to precipitate the emerging of any in 1879, — that is, to compel any which would naturally have emerged in 1880, to do so in 1879. On examining the proportion of hibernating chrysalids from several broods of *ajax*, as recorded in Butterflies of N. A., v. 1, p. 11–13, I find that of all broods in and after May, about one-half the chrysalids gave butterflies the same year. The figures are 14-39 [0.36], 10-17 [0.59], 6-10 [0.60], 40-

76 [0.53] [average, 0.52], the first representing the earlier broods. Of the 69 pupae of June 1879 (PSYCHE, p. 4), 34 yielded butterflies the same season; and of the 35 of same lot, which were iced, 16 emerged the same season.

By this it does not appear that cold made any butterfly emerge in 1879 whose natural term was 1880. It is impossible to be absolutely certain of this fact, but the probability is very strong that the change produced by cold was in coloration, or in the clothing (as in the frontal hairs). What should have emerged in 1879 as the summer form did so emerge in shape, but presented the coloration of the winter form.

I call to mind only two species of North American butterflies in which there is a decided difference of shape between the winter and summer forms, namely, *P. ajax* and *Grapta interrogationis*. In other species, as the shape is identical in both forms, it could not be ascertained whether the application of cold had affected anything beyond the coloration or clothing.

LARVAE OF THE FAMILY *PYROCHROIDAE*.

BY HENRY LORING MOODY, MALDEN, MASS.

The larva of *Dendroides canadensis* is a type of the larvae of the *Pyrochroidae*, of which family I have bred four species, namely, *D. canadensis*, *D. concolor*, *Pyrochroa flabellata*, and *Schizotus cervicalis*. These larvae all have a much flattened and appressed body, a vertically compressed head slightly broader than the prothorax, and, attached to the final segment, a corneous plate, produced into two distant, horizontal, more or less curved processes. Three of the species are honey yellow, and approximate very nearly in size. The fourth, *Schizotus cervicalis*, is of a smoky tint and smaller. The color separates this last from the other three, which may be separated from each other by the corneous plate and processes. In *D. canadensis* the processes are nearly one third longer than the basal portion, are rather slender, regularly though moderately curved inward, and have fine granulations which are more numerous toward the tips. Between these processes at their bases, are found two small blind cavities, or *cul-de-sacs*, which do not appear at all when looked for from above.

In *D. concolor* the processes are stouter, nearly straight, and hardly longer than the basal portion. The tips are obliquely cut off on their inner side. The *cul-de-sacs* between them are larger than in *D. canadensis*, and have at their lower side a slightly projecting lip, which can be seen from above. The modification of these characters in *P. flabellata* is more marked; the processes are straight on the inner edge, still shorter in proportion to the base than in the previous species, and the granulations are much stronger. On the under side of each process, near the base, there is a tooth-like projection, and the outer edge at the base has two such projections, one smaller than the other. The *cul-de-sacs* are very large, with the projecting lip prominent and emarginate at the middle.

In conclusion a word in regard to the curious *cul-de-sacs*. They are deep, and suggest a possible organic use; but thus far, though I have carefully dissected for the purpose, I have not found that they are in any way connected with the internal organs, or have any opening into the interior of the body.

PSYCHE.

CAMBRIDGE, MASS., JUNE 1880.

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PROCEEDINGS OF SOCIETIES.

CAMBRIDGE ENTOMOLOGICAL CLUB.

13 FEB. 1880. — 65th meeting. Mr. S: H. Scudder read a letter from Mr. W: H: Edwards, who says he has received four specimens of *Grapta faunus* from Oregon. This species was not previously known to occur west of Lake Winnipeg.

12 MAR. 1880. — 66th meeting. Dr. H. A. Hagen gave a summary of the literature hitherto formed upon suction in the proboscis of lepidoptera. Mr. S: Henshaw exhibited a living *Lepisma saccharina* which had eaten some large holes through a piece of soft white paper enclosed in the vial with it. Mr. S: H. Scudder showed, under the microscope, the tips of the proboscis of several species of butterflies, to call attention to the various appendages which may there be found. Mr. S: H. Scudder showed specimens illustrating the manner in which *Oecanthus niveus* lays her eggs. Brunner thinks the American and European species are the same, but Scudder doubts this. The American species or form lays one egg in each hole, but the European species lays three eggs in each hole. Dr. H. A. Hagen exhibited a *Sphinx* imago, in which the head was extremely small.

9 APRIL 1880. — 67th meeting. In accordance with the amendment to the constitution, adopted at the last meeting, Clifford Chase Eaton was elected Librarian.

Mr. S: H. Scudder showed two plates of figures illustrating fossil insects from the Green River shales of Colorado, and said that the basin of Florissant, whence these fossils are obtained, is filled with volcanic ash and volcanic sand. Dr. H. A. Hagen gave some account of his recent studies upon the larvae of *Agrionina*, and mentioned that the larva of *Blepharocera* [a dipteron] had been discovered. Mr. S: H. Scudder said that he had finished the preparation of a paper on *Retinia frustrana*, which is destroying *Pinus rigida* on the island of Nantucket, Mass. He finds that the moth has two broods in a year.

14 MAY 1880. — 68th meeting. Mr. S: H. Scudder described the formation and character of the insect-bearing peat-beds of Nantucket, . . . and gave notice that Mr. Whitman, residing at No. 5, Kaga Yashiki, Hogo, Japan, wishes to exchange Japanese insects for others. . . .

11 JUNE 1880. — 69th meeting. Mr. S: H. Scudder said that on 5 June he found the imagos of *Retinia frustrana* in innumerable abundance at Nantucket, and noticed in them a habit directly contrary to one he had noted on a previous visit, in May. On the previous visit, when nearly all the specimens were males, they alighted on the tip of a needle of the pine, ran down to the brown part of the twig, and then placed themselves in a position transverse to the twig. At this time (June), when nearly all the imagos were females, they alighted at the base of the needles, ran thence to the tip, and rested longitudinally upon the needle. Mr. Scudder sought in vain for the eggs, which are probably laid between the leaf-scales, near the tip of the shoot, and thinks the time of laying may be later. He obtained eggs by confining the imago in a pill-box. At the end of September 1878 about a half of the insects were larvae and about a half were pupae. The imagos appeared in the latter part of April and early part of May. The corresponding European species, *Retinia duplana*, which injures *Pinus sylvestris*, develops into pupae rapidly in the spring, but the pupae lie eight months undeveloped, according to Ratzeburg.

B: PICKMAN MANN,
Secretary.

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [ ], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

Corrections of errors and notices of omissions are solicited.

Allen, Grant. Colour in nature. (Nature, 24 April 1879, v. 19, p. 580–581, 33 cm.)

Crit. rev., by A. R. Wallace, entitled, "Remarks by the reviewer." (Nature, 24 April 1879, v. 19, p. 581, 10 cm.)

Crit. rev. of A. R. Wallace's crit. rev., entitled, "Colour in nature. . . ." (Nature, 3 April 1879, v. 19, p. 501–505) [Psyche, Rec., no. 1718], of the author's "Colour sense: its origin . . ." [Psyche, Rec., no. 1648]. Colors of caterpillars very briefly discussed. *G: D.* (1647)

Allen, Grant. The colour-sense: its origin and development. An essay in comparative psychology. London, Trübner & Co., 1879. (The English and foreign philosophical library, v. 10.) 12 + 282 p., 22 × 14, t 15.5 × 8.8.

Imported sheets, with new imprint, Boston, Houghton, Osgood & Co., 1879. (The English and foreign philosophical library, v. 14.) 12 + 282 p., 22 × 14, t 15.5 × 8.8. cl., $3.50.

Crit. rev., by A. R. Wallace, entitled "Colour in nature. . . ." (Nature, 3 April 1879, v. 19, p. 501–505.)

Rev. and extracts (in Germ.) by Hermann Müller, entitled "Grant Allen, der Farbensinn, sein Ursprung und seine Entwickelung." (Kosmos [Leipzig], July 1879, bd. 5, p. 308–319, 427 cm.)

Crit. rev., by E. Krause, entitled "Nachschrift über Ideen-Adoptiv-Väter." (Kosmos [Leipzig], July 1879, bd. 5, p. 319–324, 209 cm.)

Crit. rev. (Biblioth. universelle et rev. suisse, Nov. 1879, an. 84, période 3, v. 4, p. 349–355.)

For reviews of Wallace's review, and further discussion, *see* Wallace, A. R., "Colour in nature . . ." [Psyche, Rec., no. 1718] *G: D.* (1648)

Animal rubber. (Sci. amer., 3 Jan. 1880, v. 42, p. 3, col. 3, 3 cm.)

Upon niin from *coccus adipofera.* *G: D.* (1649)

[**Carboniferous** butterflies.] Gab es schon während der Steinkohlenzeit Schmetterlinge? (Kosmos [Leipzig], June 1879, bd. 5, p. 218–219, 42 cm.)

Reviews the questions under discussion in R. McLachlan's and A. R. Wallace's "Did flowers exist during the carboniferous epoch?" (Nature, April and May 1879) [Psyche, Rec., no. 1665, 1719, 1666]. *G: D.* (1650)

Cassino, S: E., *ed.* The naturalists' directory for 1878, containing the names of the naturalists of America north of Mexico, arranged alphabetically, and by departments; also a list of scientific societies, and a catalogue of obtainable scientific books, arranged by subjects. Salem, Naturalists' agency, 1878. 184 + 16 + 9 + 15 p., 20 × 13.

B: P. M. (1651)

Cocuyo (The), the brilliant fire-fly of the tropics. (Springfield [Mass.] d. republican, 30 April 1879, p. 3, col. 1, 10 cm.)

Extract from a letter from Vera Cruz, Mexico, in the *N. Y. evening post.* Describes the use of the cocuyo (*pyrophorus noctilucus*) as an ornament for the hair and clothing. *G: D.* (1652)

Dondé Ibarra, Joaquin. Ni-in. (La emualcion [Merida, Yucatan], 1879, v. 2, no. 11, p. 174–180.)

Abstract, entitled, "An oil-producing insect." (Sci. amer., 3 Jan. 1880, v. 42, p. 10, col. 1, 22 cm.)

Proposes the name *coccus adipofera* for the niin insect of Yucatan; describes the fatty secretion of this insect. *G: D.* (1653)

[**Dondé Ruiz,** Juan.] Al "Scientific american supplement." (La emulacion [Merida, Yucatan], July 1879, v. 3, no. 20–24, p. 316–317.)

Translation of, and notes upon a brief article entitled "An interesting insect," in *Scientific american supplement,* no. 184 (July 1879); on the niin insect (*coccus adipofera*) of Yucatan. *G: D.* (1654)

First paper-maker (The). (The paper world [Holyoke, Mass.], Jan. 1880, v. 1, p. 16, 25 cm.)

Wasps as paper-makers. *G: D.* (1655)

Giard, Alfred. Deux espèces d'*entomophthora* nouvelles pour la flore française et présence de la forme *tarichium* sur une muscide. (Bull. sci. du dépt. du nord, s. 2, an. 2, p. 353–363.)

Separate, with same paging, Lille, [1880]. 22 × 13.5, t 15 × 8.8.

Considers that only the first of the three names, *entomophthora, empusa* and *tarichium* ought to remain as a generic name, the others being forms of the first. These fungi reproduce themselves asexually during warm weather, when insects are abundant, but in the autumn they produce oospores to remain over winter. Describes *entomophthora calliphorae* (new species), form *tarichium*, from *calliphora vomitoria*, and gives notes upon *e. rimosa* and *e. megasperma.* *G: D.* (1656)

Graber, Vitus. Die Insekten. I. Theil: Der Organismus der Insekten. Mit 200 Original-Holzschnitten. t.-p. cover, 8 + 404 p. II. Theil, 1 Hälfte: Vergleichende Lebensgeschichte der Insekten. Mit 86 Original-Holzschnitten. t.-p. cover, 6 + 262 p. II. Theil, 2 Hälfte: Vergleichende Lebens- und Entwicklungsgeschichte der Insekten. Mit 127 Original-Holzschnitten. t.-p. cover, 8 p. + p. 263–604. München, R. Oldenbourg; I. Th. und II. Th., 1 Hälfte, 1877; II. Th., 2 Hälfte, 1879. (Die Naturkräfte. Eine naturwissenschaftliche Volksbibliothek, bd. 21–22.) complete, pap., 9 M.

Rev., entitled, "Graber's Insects." (Amer. nat., Oct. 1878, v. 12, p. 689–690; Dec. 1879, v. 13, p. 774–775.)

Rev., entitled, "Drei neue Werke über Insektenkunde." (Kosmos [Leipzig], March 1880, bd. 6, p. 487–488, 48 cm.)

An illustrated general work on the anatomy, comparative life-history, and development of insects. The author is professor of zoology in the Czernowitz University in Austria. *G: D.* (1657)

Graber, Vitus. Die tympanalen Sinnesapparate der Orthopteren. (Denkschrift d. kais. Akad. d. Wissensch., math.-naturwissensch. Classe, 1876, bd. 36, abth. 2, p. 1–140, pl. 1–10.)

Separate, with t.-p. cover and t.-p., Wien, K. Gerold, 1876, 140 p., 10 pl., 31 × 25, t 24 × 17.2.

Anatomical. *G: D.* (1658)

Hagen, Hermann August. Obnoxious pests. Suggestions relative to their destruction by Dr. Hazen [*sic*], read before the Thursday club, April 3, 1879. (Boston even. transcript, 11 April 1879, v. 52, no. 15946, p. 6, col. 2–3, 64 cm.)

Reprint. (Can. entom., June [July] 1879, v. 11, p. 110–114.)

Reprint, with large additions, entitled, "Destruction of obnoxious insects, phylloxera, potato beetle, cotton-worm, Colorado grasshopper, and greenhouse pests, by application of the yeast fungus." Cambridge, 1879. half t.-p. cover + 11 p., 23 × 15, t 17 × 9.6. [Sold by C: W. Sever, Cambridge, Mass.; price 10 cts.]

Rev. (Nation, 11 Dec. 1879, v. 29, p. 402–403, 10 cm.)

Rev. in E. Metschnikoff's "Zur Lehre über Insectenkrankheiten." (Zool. Anzeiger, 26 Jan. 1880, jahrg. 3, p. 44–47.)

Rev. (Amer. nat., Feb. 1880, v. 14, p. 133–134.)

Summary of investigations and experiments made by several persons, leading to the conclusion that fly fungus (*empusa muscae*), common mould (*mucor mucedo*), yeast fungus (*hormiscium cerevisiae*) and *achlya prolifera*, are different developments of the same species, and that insects sprinkled with or fed on beer mash or yeast fungus will become infested with spores and will be killed, besides communicating the disease to other insects. Hagen's original contribution to the subject is the suggestion that yeast fungus should be used as the propagator of the disease. *G: D., B: P. M.* (1659)

Hagen, Hermann August. Destruction of obnoxious insects, phylloxera, potato beetle, cotton-worm, Colorado grasshopper, and greenhouse pests, by application of the yeast fungus. Cambridge, 1879. Half t.-p. cover + 11 p., 23 × 15, t 17 × 9.6. [Sold by C: W. Sever, Cambridge, Mass.; price 10 cts.]

Reprint, with large additions, of the author's "Obnoxious pests. . . ." [Psyche, Rec., no. 1659]. *B: P. M.* (1660)

Krause, Ernst. Nachschrift über Ideen-Adoptiv-Väter. (Kosmos [Leipzig], July 1879, bd. 5, p. 319–324, 209 cm.)

Crit. rev. of Grant Allen's "Colour sense: its origin and development. . . ." [Psyche, Rec., no. 1648], in which Krause accuses the author of taking, without acknowledgment, the theories of others. *G: D.* (1661)

Lelièvre, Ernest. Chrysalide piquée de *vanessa urticae*, "la petite tortue." (Feuille des jeunes naturalistes, Nov. 1879, an. 9, p. 15.)

Notes 228 ichneumons from one chrysalis. *G: D.* (1662)

Lelièvre, Ernest. Régime alimentaire de certaines espèces de lépidoptères. (Feuille des jeunes naturalistes, Oct. 1879, an. 9, p. 153–154.)

Mentions a number of species of French diurnal lepidoptera which feed on excrement, decayed trees, ripe fruit, and upon the stagnant water of pools. *G: D.* (1663)

Léonard, Ad. Abondance du *colias edusa*, var. ♀ *helice* Hb. (Feuille des jeunes naturalistes, Jan. 1880, an. 10, p. 38.) *G: D.* (1664)

McLachlan, Robert. Did flowers exist during the carboniferous epoch? (Nature, 17 April 1879, v. 19, p. 554, 6 cm.)

Crit. rev., by A. R. Wallace, with same title. (Nature, 24 April 1879, v. 19, p. 582, 10 cm.)

Answer to Wallace's crit. rev., by McLachlan, with same title. (Nature, 1 May 1879, v. 20, p. 5–6, 14 cm.)

"Mr. A. R. Wallace, in his review of Mr. Allen's 'The colour sense' (Nature, v. xix, p. 501), has been misled in supposing the fossil insect from the Belgian coal-fields, namely *breyeria borinensis*, may be a moth. . . . Thus we remain without any zoological evidence that would tend to prove the existence of flowering plants in the carboniferous age." *G: D.* (1665)

McLachlan, Robert. Did flowers exist during the carboniferous epoch? (Nature, 1 May 1879, v. 20, p. 5–6, 14 cm.)

Rev., entitled, "Gab es schon während der Steinkohlenzeit Schmetterlinge? (Kosmos [Leipzig], June 1879, bd. 5, p. 218–219, 42 cm.)

Opposes the views expressed in A. R. Wallace's "Did flowers exist . . ." (Nature, 24 April 1879, v. 19, p. 582 [Psyche, Rec., no. 1719]. *G: D.* (1666)

Marès, H. Du traitement des vignes phylloxérées. (Comptes rendus, 5 Jan. 1880, v. 90, p. 28–31.)

Abstract. (Rev. scientifique, 17 Jan. 1880, an. 9, p. 689, 7 cm.) *G: D.* (1667)

Müller, Hermann. *Bombus mastrucatus*, ein Dysteleolog unter den alpinen Blumenbesuchern. (Kosmos [Leipzig], Sept. 1879, bd. 5, p. 422–431, 357 cm.)

Rev. and abstract by W: Trelease, entitled, "The humble bee a dysteleologist among alpine flower visitors." (Amer. nat., April 1880, v. 14, p. 288–291.)

Discusses the beneficial and injurious effects of *b. mastrucatus* upon flowers, and the means of protection of certain flowers against the incursion of this insect. *G: D.* (1668)

Müller, Hermann. Grant Allen, der Farbensinn, sein Ursprung und seine Entwickelung. (Kosmos [Leipzig], July 1879, bd. 5, p. 308–319, 427 cm.)

Rev. and abstract of, with extracts (in Germ.) from G. Allen's "Colour sense: its origin and development. . . ." [Psyche, Rec., no. 1648]. *G: D.* (1669)

Oil-producing insect (An). (Sci. amer., 3 Jan. 1880, v. 42, p. 10, col. 1, 22 cm.)

Concerning the niin insect (here called *coccus adipofera*) and the oil from it; facts from *La emulacion* (Merida, Yucatan). *G: D.* (1670)

Packard, Alpheus Spring, *jr.* Moths entrapped by an asclepiad plant, *physianthus*, and killed by honey bees. (Amer. nat., Jan. 1880, v. 14, p. 48–50.)

Discussion of the carnivorous habits of *apis mellifica*, based upon a letter from L. Thompson. Opinions of Professors Cook, Darwin, and Gray, and of Dr. Hermann Müller upon the modes of capture and of killing of insects by the flowers of plants, and upon carnivorous habits of bees. *G: D.* (1671)

Patton, W: Hampton. A gall inhabiting ant. (Amer. nat., Feb. 1879, v. 13, p. 126–127.)

Describes *stenamma gallarum*, a new species of ant from Connecticut. This ant inhabits galls of *gelechia gallaesolidaginis* and of *cynips spongifica*, and frequents flowers of *viola* and *potentilla*. *G: D.* (1672)

Pierce, Newton B. Sound-producing organs of the cricket. (Amer. nat., May 1879, v. 13, p. 322–324, 2 fig.)

Figures sound-producing organs of *gryllus*. *G: D.* (1673)

Plötz, Carl. Die Hesperiinen-Gattung *pyrrhopyga* und ihre Arten. (Entom. Zeitung . . . zu Stettin, Oct.–Dec. 1879, jahrg. 40, p. 520–538.)

Species from Mexico and southward. *G: D.* (1674)

Potts, E: Shedding of the tracheae in the molting of insects. (Amer. nat., July 1879, v. 13, p. 454.)

Notice, by C: V. Riley, entitled, "The shedding of the tracheae and double cocoons." (Amer. nat., Oct. 1879, v. 13, p. 652.)

Observations on *bombyx mori*. *G: D.* (1675)

Potts, E: Two chrysalids in the same cocoon [of *bombyx mori*]. (Amer. nat., July 1879, v. 13, p. 455.)

Notice, by C: V. Riley, entitled, "The shedding of the tracheae and double cocoons." (Amer. nat., Oct. 1879, v. 13, p. 652.) *G: D.* (1676)

[**Proctotrupidae,** Very small specimen from amber.] (Amer. nat., Jan. 1879, v. 13, p. 62.) *G: D.* (1677)

Reichenau, W. [Petroleum und Naphthalin] Als Mittel gegen Raubinsecten. (Zool. Anzeiger, 3 Nov. 1879, jahrg. 2, p. 573–574.) *G: D.* (1678)

Reichenbach, H. Wie die Insekten sehen. (Daheim [Leipzig], 31 Jan. 1880, jahrg. 16, p. 284–286, 4 fig., 118 cm.)

Popular. *G: D.* (1679)

Riley, C: Valentine. Locust flights east of the Mississippi. (Sci. amer., 16 Dec. 1876, v. 35, p. 392, col. 1–2, 67 cm., 2 fig.) (Trans. Kansas acad. sci., 1877, v. 5, p. 62–64.)

Treats of *caloptenus spretus* and *acridium americanum*. *G: D.* (1680)

Riley, C: Valentine. The shedding of the tracheae and double cocoons. (Amer. nat., Oct. 1879, v. 13, p. 652.)

Notice of E: Potts' "Shedding of the tracheae in the molting of insects" (*l. c.*, p. 454) [Psyche, Rec., no. 1675] and "Two chrysalids in the same cocoon" (*l. c.*, p. 455) [Psyche, Rec., no. 1676]. *G: D.* (1681)

Riley, C: Valentine. The westward progress of the imported cabbage worm. (Amer. nat., June 1879, v. 13, p. 393.)

Spread of *pieris rapae* in the U. S.; remedies and preventive measures. From a paper read before the Missouri State Horticultural Society in Jan. 1879. *G: D.* (1682)

Root, A. I. The A B C of bee culture: . . . [Psyche, Rec., no. 1543].

Rev. (Saturday rev., 28 Feb. 1880, v. 49, p. 295, 3 cm.) *G: D.* (1683)

Russell, Israel C. The fertilization of the *wistaria*. (Amer. nat., Oct. 1879, v. 13, p. 648–649.)

How *wistaria frutescens* is fertilized by *bombus* and other insects. *G: D.* (1684)

Ryder, J: A. An account of a new genus of minute pauropod myriapods. (Amer. nat., Oct. 1879, v. 13, p. 603–612, il.)

Describes and figures *eurypauropus spinosus* (new genus and species from Pennsylvania), and gives a revision of the *pauropoda*. *G: D.* (1685)

Ryder, J: A. Bees gathering honey from the *catalpa*. (Amer. nat., Oct. 1879, v. 13, p. 648.)

Apis mellifica gathers honey from the nectariferous glands of *catalpa bignonioides*. *G: D.* (1686)

R[yder], J: A. Note on a larval *lithobius*-like myriapod. (Amer. nat., May 1880, v. 14, p. 376.) *G: D.* (1687)

Ryder, J: A. *Scolopendrella* as the type of a new order of articulates, *symphyla*. (Amer. nat., May 1880, v. 14, p. 375–376.)

Defines a new order, *symphyla*, of which *scolopendrella* is given as type. *G: D.* (1688)

Ryder, J: A. A probable new species of *phytoptus* or gall-mite. (Amer. nat., Nov. 1879, v. 13, p. 704–705, 1 fig.)

G: D. (1689)

Saunders, W: Insect powder. (Can. entom., March 1879, v. 11, p. 41–43.) (Amer. nat., Sept. 1879, v. 13, p. 572–574.)

Powder of *pyrethrum* and its uses. *G: D.* (1690)

DE **Saussure,** Henri F. Spicilegia entomologica genavensia. 1. Genre *hemimerus.* [Tiré des Mémoires de la société de physique et d'histoire naturelle de Genève, tome XXVI, 2me partie.] Genève, 1879. t.-p. cover, 26 p., 1 pl., 31 × 23, t 18 × 13.

Hemimerus talpoides Walker, from Sierra Leone, has one more mouth-part than insects have, and therefore is not, as has been supposed; an orthopteron. *Hemimerus* has, according to the author: 1. a labrum, 2. two mandibles, 3. two maxillae, 4. a superior labium (endolabium), 5. an inferior labium (ectolabium). Compares *hemimerus* with other insects; proposes a new order, *diploglossata*, for it; figures *hemimerus* and its parts. *G: D.* (1691)

Schneck, J. The chipping versus the European sparrow. (Amer. nat., Feb. 1880, v. 14, p. 129–130.)

Passer domesticus rarely devours larvae of *pieris rapae*; *spizella socialis* eats them readily. *G: D.* (1692)
[Name wrongly given as S. Schneck.] J. S.

Scudder, S: Hubbard. Notice of the butterflies collected by Dr. Edward Palmer in the arid regions of southern Utah and northern Arizona during the summer of 1877. (Bull. U. S. geol. and geog. surv. terr., 1878, v. 4, no. 1, p. 253–258.)

Enumerates 41 species, with localities and dates; describes the following 3 n. sp.: *neominois dionysus, synchloe thoosa, heteropterus libya;* notes on other species. *B: P. M.* (1693)

Seasonable hints [regarding the care of bees.] (Rural new yorker, 12 June 1880, v. 39, no. 24, p. 377, col. 4, 34 cm.)

Practical remarks on the care of bees in the month of June. *J. D. P.* (1694)

Sections of insects. (Amer. nat., Feb. 1873, v. 7, p. 119.)

How to prepare sections for the microscope. *G: D.* (1695)

S[immonds], P. L. The Tusser silk-worm. (Journ. applied sci., Oct. 1879, v. 10, p. 153–154, 86 cm.)

Discussion of the possibility of utilizing, to a greater extent than at present, the cocoons of the wild silk moths, species of *attacus* or *antheraea*, in India; notes and statistics from various sources. *G: D.* (1696)

Snow, Frank H. List of coleoptera collected in Colorado in June, July and August, 1876, by the Kansas university scientific expedition. (Trans. Kansas acad. sci., 1877, v. 5, p. 15–20.)

Enumerates 304 species belonging to 34 families, with notes. *G: D.* (1697)

Sograff, N. Vorläufige Mittheilungen über die Organisation der Myriapoden. (Zool. Anzeiger, 13 Jan. 1879, jahrg. 2, p. 16–18.)

Brief outline of results obtained from study of the anatomy of *cermatia, lithobius, scolopendra, himantarium, geophilus* and *henicops*, especially of *lithobius.* *G: D.* (1698)

Spengel, J. W. Einige neue Verbesserungen am Schlitten-mikrotom. (Zool. Anzeiger, 15 Dec. 1879, jahrg. 2, p. 641–648, 4 fig.)

G: D. (1699)

Sprague, C: J. Insects caught by the *physianthus.* (Amer. nat., Feb. 1880, v. 14, p. 128.)

Physianthus albens captures insects. *G: D.* (1700)

Sprague, H: S. Lectures for the people. The 8th lecture before the [Buffalo] society of natural sciences. Insects. (Buffalo [N. Y.] d. courier, 26 Feb. 1877, v. 42, no. 57.)

A 2 1-2 column full report of a popular general lecture on insects. *G: D.* (1701)

Statistics of cochineal production in the Canary Islands. (New remedies, April 1880, v. 9, p. 118, 6 cm.)

From *Amer. mail and export journ.;* originally from *Cronica de la industria* [Madrid, Spain]. *G: D.* (1702)

Stone, Octavius C. A few months in New Guinea. N. Y., Harper & Bros., 1879. 25 p., 28.5 × 20.5, t (3 columns) 25 × 17.5. (Franklin sq. lib., no. 92.) pap., 10 c.

Mentions (p. 11, col. 2) natives capturing and eating head-lice (*pediculus*), and discusses (p. 17, col. 3) the comparative abundance of mosquitoes (*culex*) in different countries, temperate and tropical. Appendix gives native names of some insects. *G: D.* (1703)

Stroop, S. J. *Oestrus hominis* in Texas. (Amer. nat., July 1873, v. 7, p. 437.)

The editors of *Amer. nat.* determine the specimen, taken from the shoulder of a boy, to be *oestrus ovis*, or a closely allied species. *G: D.* (1704)

Taylor, J. R. Curious habit of the English sparrow. (Amer. nat., Nov. 1879, v. 13, p. 706.)

Passer domesticus captures *doryphora decemlineata* on the wing. *G: D.* (1705)

Th., H. À propos de l'invasion de la *vanessa cardui* en France, dans l'été de 1879. (Feuille des jeunes naturalistes, an. 9, Oct. 1879, p. 153.)

Flights of *v. cardui*, and abundance of *plusia gamma* and of other lepidoptera in France in 1879. General notes on insect flights. *G: D.* (1706)

Thomas, Cyrus. Passage of specific characters from one genus to another. (Amer. nat. Sept. 1873, v. 7, p. 566.)

Specimens of *acrididae* from Arizona "which, in specific characters, including even color, agree exactly with *acrolophitus hirtipes*, but differ in two prominent generic characters." *G: D.* (1707)

Tichomiroff, A. Ueber die Entwickelungsgeschichte des Seidenwurms. (Zool. Anzeiger, 3 Feb. 1879, jahrg. 2, p. 64–67.)

Brief results of researches on *bombyx mori,* to be published later in the *Arbeiten aus dem Laboratorium des Zool. Mus. Moskau.* *G: D.* (1708)

Todd, James E. On certain contrivances for cross-fertilization in flowers. (Amer. nat., Jan., 1879, v. 13, p. 1–6, fig. 1–8.)

Almost wholly botanical. *G: D.* (1709)

Torrey, Bradford. Migration of dragon flies. (Amer. nat., Feb. 1880, v. 14, p. 132–133.)

Migrations seen in Weymouth and Boston, Mass. *G: D.* (1710)

Trade in cochineal (The). (Journ. applied sci., 1 March 1880, v. 11, p. 42, 5 cm.)

Statistics of exportation of cochineal from the Canary Islands, from 1873 to 1879, taken from *Cronica de la industria* [Madrid, Spain]. *G: D.* (1711)

Treat, Mary. The habits of a tarantula. (Amer. nat., Aug. 1879, v. 13, p. 485–489, 2 figs.)

Figures and describes nest of *tarantula nigrina;* notes upon other habits of the species. *G: D.* (1712)

Treat, Mary. Observations on the sundew. (Amer. nat., Dec. 1873, v. 7, p. 705–708.)

Drosera filiformis captures not only tiny insects but also large flies, and many moths and butterflies. *G: D.* (1713)

Trelease, W: The humble bee a dysteleologist among alpine flower visitors. (Amer. nat., April 1880, v. 14, p. 288–291.)

Rev. and abstract of H. Müller's "*Bombus mastrucatus,* ein Dysteleolog unter den alpinen Blumenbesuchern" (Kosmos, Sept. 1879, bd. 5, p. 422–431) [Psyche, Rec. no. 1668]. *G: D.* (1714)

[**United States** entomological commission, Appropriations for the.] (Amer. nat., May 1879, v. 13, p. 342–343.)

G: D. (1715)

Voges, Ernst. Zur Morphologie und Anatomie der Juliden. I. Das Tracheensystem von *glomeris.* (Zool. Anzeiger, 16 Dec. 1878, jahrg. 1, p. 361–363.)

G: D. (1716)

Wailly, Alfred. On silk-producing *bombyces* and other lepidoptera. Reprinted from the "Journal of the society of arts," February 13th and March 5th 1880. London, [March] 1880. t.-p. + 6 p., 25 × 16.5, t 21 × 13.5.

Mostly biological. *Bombyx trifolii* hibernates as developed larva in the egg; the stages in which other bombycids hibernate; effects of the weather, during 1879, on species of lepidoptera reared; pairing of several species, its duration, its hindrance by cold; number of eggs laid by several species, and their fertility when different species are crossed; hybrids obtained by crossing different species and the degeneracy of these hybrids in a state of confinement; more extended notes on *attacus mylitta* (= *antheraea paphia*), the Tussar or Tusser silkworm, with brief description of eggs and six stages of the larvae. Species upon which notes are given: *actias luna, a. selene, attacus carpini, a. cynthia, a. mylitta, a. pernyi, a. pyri, a. roylei, a. spini, bombyx trifolii, endromis versicolora, gortyna flavago, papilio alexanor, p. machaon, p. podalirius, samia cecropia, s. gloveri, s. promethea, saturnia io, s. maia, sericaria mori, s. yama-mai,* and *telea polyphemus.* *G: D.* (1717)

Wallace, Alfred Russel. Colour in nature. [A crit. rev. of] The colour sense: its origin and development. An essay in comparative psychology. By Grant Allen, B. A. (Nature, 3 April 1879, v. 19, p. 501–505.)

Crit. rev., by R. McLachlan, entitled "Did flowers exist during the carboniferous epoch?" (Nature, 17 April 1879, v. 19, p. 554, 6 cm.)

Crit. rev., by G. Allen, entitled, "Colour in nature." (Nature, 24 April 1879, v. 19, p. 580–581, 33 cm.)

Reply to Allen's rev., by Wallace, entitled, "Remarks by the reviewer." (Nature, 24 April 1879, v. 19, p. 581, 10 cm.)

Reply to McLachlan's rev., by Wallace, entitled, "Did flowers exist. . . ." (Nature, 24 April 1879, v. 19, p. 582, 10 cm.)

Answer to Wallace's reply to McLachlan, by McLachlan, entitled, "Did flowers exist. . . ." (Nature, 1 May 1879, v. 20, p. 5–6, 14 cm.)

Rev. of Wallace's reply to McLachlan, entitled, "Gab es schon während . . ." (Kosmos [Leipzig], June 1879, bd. 5, p. 218–219, 42 cm.) *G: D.* (1718)

Wallace, Alfred Russel. Did flowers exist during the carboniferous epoch? (Nature, 24 April 1879, v. 19, p. 582, 10 cm.)

Crit. rev., by R. McLachlan, with same title. (Nature, 1 May 1879, v. 20, p. 5–6, 14 cm.)

Rev., entitled, "Gab es schon während der Steinkohlenzeit Schmetterlinge?" (Kosmos [Leipzig], June 1879, bd. 5, p. 218–219, 42 cm.)

Places *breyeria borinensis* among the lepidoptera, contrary to views expressed in R. McLachlan's "Did flowers exist . . ." (Nature, 17 April 1879, v. 19, p. 554) [Psyche, Rec., no. 1665]. *G: D.* (1719)

Wallace, Alfred Russel. Remarks by the reviewer. (Nature, 24 April 1879, v. 19, p. 581, 10 cm.)

Reply to G. Allen's "Colour in nature" (Nature, 24 April 1879, v. 19, p. 580–581) [Psyche, Rec., no. 1647]. Contains a few words on coloration of caterpillars. *G: D.* (1720)

Waterhouse, C: O. Note on the locality and synonyms of *stenotomis cornutor* Fabr., coleoptera, *lamiidae.* (Annals and mag. nat. hist., May 1878, s. 5, v. 1, p. 424.)

Gives *s. cornutor, s. norrisi* and *s. maculata* as synonyms. *R. H.* (1721)

Williston, S: Wendell. Singular habit of a meloid beetle. (Amer. nat., Jan. 1879, v. 13, p. 45.)

Tricrania stansburii found in great numbers, in Kansas, on decaying bones. *G: D.* (1722)

Williston, S: Wendell. Some interesting new diptera. (Trans. Conn. acad., 1880, v. 4, p. 243–246.)

Separate, with half-t.-p. cover, [New Haven, author, 1880]. p. 243–246, 23 × 15, t 17.2 × 10.3.

Describes *rhynchocephalus sackenii, silvius pollinosus, chrysops discalis,* from western North America. *B: P. M.* (1723)

ENTOMOLOGICAL ITEMS.

Numerous welcome responses have been received from persons who propose to present papers at the annual meeting of the Fntomological Club of the A. A. A. S. at Boston this year.

Dr. J: L. LeConte's pestifuge, or poisonous mixture for use with an atomizer in disinfecting insect cabinets can be obtained of Horace S. Bartlett, Cambridge, Mass., in any quantity, by applying for mixture no. 15,773.

Mr. E: P. Austin intends to publish a supplement to Crotch's List of Coleoptera, containing the names of omitted or new species, with current numeros, in continuation of those used by Crotch.

The papers on fossil insects contributed by Mr. Goss to the last two volumes of the *Entomologist's Monthly Magazine*, of London, are to be collected in a pamphlet of about fifty pages, entitled, "The Geological Antiquity of Insects." These papers contain a mine of information, in a very convenient form.

On the 17th of Feb. 1880, some of the members of the Genootschap ter bevordering van Natuur-, Genees- en Heelkunde te Amsterdam assembled in the old French church in that place, at the grave of Johann Swammerdam, the famous Dutch naturalist, who died 17 Feb. 1880, two hundred years before. The president of the Genootschap, Professor B. J. Stokvis, announced the establishment of a Swammerdam-Medal, to be awarded every ten years to the naturalist who shall have accomplished most in the line in which Swammerdam worked.

Petitions have been presented to the Albany Legislature, now in session, for the appointment of an entomologist to the state of New York. Our friends would all rejoice at such a step. Dr. Fitch, we believe, was never more than entomologist to the State Agricultural Society. The Empire State cultivates a great variety of entomological as well as other crops, and needs the services of such an expert to an unusual degree.

Later. The mantle of Fitch could not have fallen more appropriately than in falling upon the shoulders of Joseph Albert Lintner of Albany, who entered upon the duties of State Entomologist of New York, 1 July 1880.

SOCIETY MEETINGS.

The regular meetings of the Cambridge Entomological Club will be held at 19 Follen St., at 7.45 p. m., on the days following: —

8 Oct. 1880.
12 Nov. „
10 Dec. „
14 Jan. 1881.
11 Feb. „
11 Mar. 1881.
8 Apr. „
13 May „
10 June „

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following: —

27 Oct. 1880.
24 Nov. „
22 Dec. „
26 Jan. 1881.
23 Feb. 1881.
23 Mar. „
27 Apr. „
25 May „

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following: —

8 Oct. 1880.
12 Nov. „
10 Dec. „
14 Jan. 1881.
11 Feb. „
11 Mar. 1881.
8 Apr. „
13 May „
10 June „

James H. Ridings, *Recorder.*

The semi-annual meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following: —

13 Dec. 1880.
13 June 1881.

James H. Ridings, *Recording Secretary.*

The regular monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following: —

6 July 1880.
3 Aug. „
7 Sept. 1880.
5 Oct. „

G: H. Bowles, *Secretary.*

PRIZE ESSAYS.

Due 15 Oct. 1882. — Life-histories of *Sclerostoma syngamus* and of *Strongilus pergracilis.* See Psyche, v. 3, p. 59.

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VI. Jahrg. 1880.

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Baron v. Harold, Entomological Museum of Berlin, says of this magazine:—

"It is a complete repository of interesting and instructive notices; of practical directions for collecting, observing, and preparing specimens; of proposals for exchange and sale of insects; of literary information and notices of books; and correspondence. In short, it has proved itself the special organ for the encouragement and progress of the Science of Entomology."

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No. 73 was issued 9 July 1880.

PSYCHE,

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

[Established in 1874.]

EDITED BY

George Dimmock, *Cambridge, Mass.;* B: Pickman Mann, *Cambridge, Mass.;*
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Cambridge, Mass.; Joseph Duncan Putnam,
Davenport, Iowa.

Vol. 3. No. 75.
July 1880.

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Cambridge, Mass., U. S. A.: Published by George Dimmock.

YEARLY SUBSCRIPTIONS, $1. MONTHLY NUMEROS, 15 c.

[Entered as second class mail matter.]

PSYCHE, Organ of the Cambridge Entomological Club.

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PSYCHE.

CHEMICAL CHANGE OF COLORATION IN BUTTERFLIES' WINGS.

BY WILLIAM HENRY EDWARDS AND JOSEPH MARTIN WILSON.

In Letters to the Editors of PSYCHE.

In coloring a proof plate for the Butterflies of N. A., the insect is enclosed in a tight shallow box, the flat sides of which are glass. When delivering the examples of *Limenitis arthemis* to the colorist, last summer, Mrs. Peart fastened in the box a bit of cotton on which was dropped a little undiluted carbolic acid (as sold by the druggists). When the colored plate was sent me for inspection, it appeared that a rich purple had been applied at every point which in the insect is metallic blue or green, and I wrote the colorist to ask for an explanation. She replied that she copied the colors of the examples furnished her. Shortly afterward, I was in Philadelphia, called on the colorist, and found that she was right. The insects were wholly changed wherever these two colors had been present, and I had to furnish other examples for copy. Of course I took care that no acid was now present.

I brought the purple examples home, and several weeks later was surprised at finding that all trace of purple had passed away and the usual colors were restored. I should be pleased to see an explanation of this. *W: H: Edwards.*

Coalburgh, W. Va., 30 April 1880.

About the first of May you sent me the enclosed letter from W: H: Edwards, asking for an explanation of the phenomenon described therein.

At the Detroit meeting of the American Association for the Advancement of Science, in 1875, Mr. George Dimmock read a paper which conclusively proved that the colors in the wings of insects are pigments. It is also well known that certain animal and vegetable coloring matters, *e. g.*, litmus, cochineal and others, are red or blue according to the character of the solution in which they are; that is, red in acid solution, blue in alkaline solution. My opinion is that the blue and green colors of the wings of *L. arthemis* are similarly affected; experiments confirm this partly but not entirely, inasmuch as strong acids turn the colors reddish and alkalies partially but not entirely restore the blue color, so that there is possibly a decomposition of the coloring matter as well as a change in color effected by the acid. Carbolic being a comparatively weak acid, is more easily neutralized; moreover, being volatile, its effects are more transient than those of the stronger acids.

I was in hopes that I might isolate the

pigment from the examples furnished by you, but as it occurs in such minute quantities I was obliged to give up that idea, and to experiment on the entire wing; this may account for my not being able to restore the blue color by means of alkalies.

Yours truly,

Joseph M. Wilson, S. B.

Charlestown, Mass.,
25 July 1880.

NOTES ON *PHOXOPTERIS ANGULIFASCIANA* ZELL.

BY CHARLES HENRY FERNALD, ORONO, ME.

On the 23d of May 1878, between one and two p. m., I saw a small Tortricid fluttering in a very peculiar manner over a patch of clover. Approaching nearer, so that I could observe more closely, I found that she was depositing her eggs on the leaves of the white clover (*Trifolium repens*).

She fluttered about on the upper side of the leaf for a little time, then standing over and in a line with the midrib, she deposited an egg on the midrib, about one-third the distance from the end. In some cases only one egg was deposited on a leaf, in others, two; but in the latter case the second egg was deposited in the same manner as the first, but at a third of the distance from the opposite end of the leaf. Having observed the manner of depositing the egg, I attempted to capture the female, but failed to do so. I therefore took up the plants into a flower pot, taking them into the house where their transformations could be observed.

The eggs were of an oval form, somewhat flattened, so as to rise but little above the surface of the leaf. The length was 0.8 mm., width 0.6 mm., thickness about 0.4 mm. Color dull grayish white, transparent at the edges; surface reticulated, as could be seen under a strong lens, with a play of colors.

The moth was not easily disturbed while depositing her eggs, and readily distinguished between the leaves of clover and sorrel, alighting several times on leaves of the latter, and as quickly flying off to another leaf, not stopping till she came to the leaves of clover.

Being called away from home at this time, I did not learn the time required for the eggs to hatch, but on my return I found that the young larvae had hatched and were feeding. They drew the edges of the leaflet up together, securing them with silk, and fed on the epidermis of the upper side of the leaflet, and on the parenchyma, leaving the epidermis of the lower side of the leaflet — now the outside of their domicil — intact, while the excrements were deposited in one end of the closed leaflet.

After having eaten all the food furnished by one leaflet, they at once left for another, going down one leafstalk and up another.

I did not have an opportunity to make a description of the larva at the time, but remember it as being dull glassy green. Early in July the moths emerged, and proved to be *Phoxopteris angulifasciana* Zell.

PSYCHE.

CAMBRIDGE, MASS., JULY 1880.

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Works on subjects not related to entomology will not be reviewed in PSYCHE.

For rates of subscription and of advertising, see advertising columns.

PROCEEDINGS OF SOCIETIES.

ENTOMOLOGICAL SECTION OF THE ACADEMY OF NATURAL SCIENCES, PHILADELPHIA, PA.

[*Abstract from the* Monthly proceedings.]

10 JAN. 1879.—Dr. G: H: Horn exhibited a *Callimorpha* and a *Heliconia* from Costa Rica, which resembled each other so closely in form and color, "that either might have been placed anong a number of specimens of the other, and, without a careful glance, would not be thought distinct." As the group to which the *Heliconia* belongs is rarely or never attacked by birds, the mimicry belongs to the "protective" class. Dr. Horn gave reasons for thinking the idea of protective resemblance had been pushed too far.—p. 2–3.

14 FEB. 1879.—Type specimens of *Catocala editha* and *C. walshii* were presented to the *American Entomological Society* by the author, W: H: Edwards. . . . A collection of 63 genera, 142 species of *rhopalocera* and 17 genera, 27 species of *heterocera*, collected by the late W. M. Gabb, in Costa Rica, was exhibited.—p. 3–4.

14 MARCH 1879.—Mr. E. T. Cresson described *Parnopes edwardsii* [see *Proceedings* for 9 May 1879, p. 10], a new species of *chrysididae*, from California; the genus had not hitherto been found represented in North America. Mr. C: A. Blake described *Mutilla gabbii* n. sp., from Costa Rica. Mr. E. T. Cresson announced the completion of his Catalog of North American *apidae*, enumerating 45 genera and 724 species, of which 113 species, principally from Mexico and the West Indies, are unknown to him; 601 species are represented in the collection of the *American Entomological Society*, and 10 are in the collections of Belfrage and Gundlach. Mr. C: A. Blake stated that *Catocala editha* is the same as *C. amatrix;* he stated also that in the summer of 1878 a *Papilio cresphontes* was captured near Philadelphia, where it very rarely occurs. Mr. E. T. Cresson announced the death of F: Smith, of the *British Museum.*—p. 4–6.

11 APRIL 1879.—Mr. E. T. Cresson described *Euparagia scutellaris*, a n. g. and sp. of *vespidae*, from Nevada, belonging probably to the tribe *masarinae;* and read descriptions of *Trigonalys mexicanus*, *T. laeviceps* and *T. nevadensis*, three new species, the former two from Mexico, and the last from Nevada. Dr. G: H: Horn reviewed the family *mycteridae*, advocating its union with *melandryidae* on the one hand and with *pythidae* on the other, and insisting on the greater importance of the sexual characters as the true means of specific distinction in the genera *Mycterus* and *Lacconotus.*—p. 6–8.

9 MAY 1879.—Mr. C: A. Blake described *Pamphila dukolum* n. sp., from Costa Rica; Mr. E. T. Cresson described *Oryssus occidentalis* and *Cleptes americana*, from Colorado and Nevada, *Oryssus mexicanus* from Mexico, and *Cleptes purpurata* from Vancouver's Island, four new species. Rev. H: C. McCook exhibited under the microscope thin sections of the mandibles of *Pogonomyrmex barbatus*, the agricultural ant of Texas, showing the loss of substance by wear on the sharp edges of the teeth. The same fact was also illustrated in the mandibles of *Pasimachus* and of other coleoptera, as well as in other members of the body exposed to wear. [See *Psyche advertiser*, May–June 1879, p. 9.] (*To be continued.*)

REVIEW.

INSECT LIVES, or Born in prison, by Mrs. Julia P. Ballard, [see Rec., no. 1725] is a very attractively written account of the author's experiences in raising a few butterflies and moths, and is well designed to interest children, or indeed older persons, in the subject, though in some particulars beyond the comprehension of children. It has the merit of accuracy and clearness, and is full of a delightful suggestiveness of the treasures in store for the young explorer who is led by it to try her own experiments. *B: P. M.*

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [ ], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

Corrections of errors and notices of omissions are solicited.

American aphides. (Nature, 24 April 1879, v. 19, p. 585, 6 cm.)

Brief rev. of C: V. Riley and Joseph Monell's "Notes on the *aphididae* of the U. S., . . ." (Bull. U. S. geol. and geog. surv. terr., 1879, v. 5, p. 1–32) [Psyche, Rec., no. 1785]. *G: D.* (1724)

Ballard, Julia Perkins [Pratt], *wife of* Addison. Insect lives, or Born in prison. Cincinnati, Robert Clarke & Co., 1879, 97 p., 19 × 15, t 13.2 × 10.1, il. cl., $1.00.

Notice. (Publishers' weekly, Oct. 1879, no. 406, v. 16, no. 17, . . .) (Title-slip registry, Oct. [Nov.] 1879, v. 1, no. 10, p. 96.)

Notice. (Boston w. advert., 13 Nov. 1879, v. 69, no. 48, p. 2, col. 8^4, 4 cm.)

Rev. (Amer. nat., Dec. 1879, v. 13, p. 774.)

Rev. (Nation, 11 Dec. 1879, v. 29, p. 408, 5 cm.)

Rev. (Atlantic monthly, Jan. 1880, v. 45, p. 128, 9 cm.)

Notice. (Cincinnati times, . . .)

[Advert.] 4 p., 24 × 16, t 17.3 × 9.8.

Rev. (Psyche, July [Oct.] 1880, v. 3, p. 89.)

Statement of the author's experiences in raising a few butterflies and moths, so told as to interest and instruct beginners in doing likewise. Information attractively given and accurate. The advertisement contains a preface, as it were, to the book, a commendatory notice by W: H: Edwards, and a reprint of the notice given in the *Cincinnati times.* *B: P. M.* (1725)

Brooklyn [*N. Y.*] entomological society. Bulletin [Prospectus of]. (Bull. Brooklyn entom. soc., May 1878, [v. 1], p. 1.) *B: P. M.* (1726)

Early types of insects (The). (Nature, 24 April 1879, v. 19, p. 584, 5 cm.)

Notice of S: H. Scudder's "The early types of insects; . . ." (Mem. Bost. soc. nat. hist., March 1879, v. 3, p. 13–21) [Psyche, Rec., no. 1789]. *G: D.* (1727)

Edwards, W: H: On the lepidoptera collected by *Dr.* Elliott Coues, *U. S. A.*, in Montana, during 1874. (Bull. U. S. geol. and geog. surv. terr., May 1878, v. 4, no. 2, p. 513–517.)

List of 22 species of *rhopalocera*, with notes on distribution. *Colias eriphyle* and *argynnis clio* described as new species. *B: P. M.* (1728)

Grey, D: Climbing Ute mountain. ([Chicago, Ill.] d. interocean, 23 Aug. 1875, . . . 95 cm.)

Briefly describes an Ute Indian mother catching and eating *pediculus* from her child's head. *G: D.* (1729)

Grote, A: Radcliffe. Descriptions of *noctuidae*, chiefly from California. (Bull. U. S. geol. and geog. surv. terr., 1878, v. 4, no. 1, p. 169–187.)

Describes the following 1 n. g. and 37 n. sp.: *apatela pallidicoma*, 18 sp. of *agrotis*, 4 sp. of *hadena*, *dryobota opina*, *arzama diffusa*, *ufeus unicolor*, *graphiphora contrahens*, *lithophane lepida* Lintn., *xylomiges tabulata*, *tarache semiopaca*, *annaphila divinula*, *melivotis stygialis*, *poaphila placata*, *p. irrorata*, *zanclognatha minimalis*, *dercetis* (n. g., types: *d. vitrea* and *d. pygmaea*), *d. vitrea*, *d. pygmaea*; describes *zotheca tranquilla* var. *viridula* n. var.; notes on other genera and species; list of the 11 N. A. species of *glaea* and of 9 species of *annaphila.* *B: P. M.* (1730)

Grote, A: Radcliffe. Preliminary studies on the North American *pyralidae.* I. (Bull. U. S. geol. and geog. surv. terr., July 1878, v. 4, no. 3, p. 669–705, fig. 1–14.)

Describes as new genera and species: *prorasea simalis*, *aedis funalis*, *honora mellinella*, *dakruma turbatella*; describes as new species: *stemmatophora nicalis*, *emprepes nuchalis*, *scoparia libella*, *botis albiceralis*, *b. talis*, *acrobasis tricolorella*, *pempelia pravella*, *pinipestis? abietivorella*; describes and figures the neuration of the genera *epipaschia*, *mochlocera*, *cacozelia*, *toripalpus*, *tetralopha*, *acrobasis*, *pempelia*, *salebria*, *nephopteryx*, *pinipestis*, *honora*, *dakruma*, *homeosoma*, *anerastia*, and species of each; describes the genera *arta*, *condylolomia* and *melanomma*, and species of each, and two species of *asopia*; annotated list of the 66 N. A. species of *botis* known to the author; character of the groups *epipaschiae* and *phycidae*; provisional list of the species of *phycidae.* *B: P. M.* (1731)

Habits of ants. (Amer. nat., Aug. 1879, v. 13, p. 525–527.)

Observations by J: Lubbock on the hairs of plants as a means of preventing ants going up the stems, on fertile worker ants, on longevity of ants and population of their nests, on recognition of friends and production of sounds by ants, on their kind treatment of other ants; by H: C. McCook on blunting of ants' mandibles by labor. *G: D.* (1732)

[**Habits** of ants.] Sitten der Ameisen (Die). (Kosmos [Leipzig], Jan. 1880, bd. 6, p. 304–313, 339 cm.)

Reviews late discoveries on the habits of ants, especially those of Lubbock. Mostly tr. from *Revue scientifique*, 19 July 1879. *G: D.* (1734)

Harrison, *Mrs.* L. All for boys. (Prairie farmer, 5 June 1880, v. 51, no. 23, p. 179, col. 4, 21 cm.)

Catching and establishing colonies of runaway bees. *J. D. P.* (1735)

Hyatt, J. D. A method of making sections of insects and their appendages. (Amer. m. micros. journ., Jan. 1880, v. 1, p. 8, 21 cm.)
Imbedding in shellac. *G: D.* (1736)

Infection from mosquitos. (Science, 3 July 1880, v. 1, no. 1, p. 10, 5 cm.)
"Mosquitos carry *filaria* in their probosces, and infect the human subject with that much dreaded worm parasite." *B: P. M.* (1737)

Isenschmidt, Moritz, [Biog. sketch], *see* Perty, M., Moritz Isenschmidt, . . . [Psyche, Rec., no. 1782]. *See also, Psyche advertiser*, March 1879, p. 8–9.

Kaempfer, F: Insect pins and cork, [etc.]. (Bull. Brooklyn entom. soc., 1878 [v. 1], p. 8, 12, 24, 32, 40, 51, 60.)
Advertisement. *B: P. M.* (1738)

Kampfmuller, W. Breeding cages for insects, [etc.]. (Bull. Brooklyn entom. soc., 1878 [v. 1], p. 24, 32, 40, 51, 60, 68, 76, 84.)
Advertisement. *B: P. M.* (1739)

Kampfmuller, W. Japanned breeding cages for coleoptera, [etc.]. (Bull. Brooklyn entom. soc., 1878 [v. 1], p. 8, 12.)
Advertisement. *B: P. M.* (1740)

Karsch, Ferd. Zur Kenntniss der Galeodiden. (Archiv. f. Naturgeschichte, 1880, jahrg. 46, bd. 1, p. 228–243, fig. 1–25 of pl. 10.)
Discussion of classification; describes new genera and species. *G: D.* (1741)

Karsch, Ferd. Zur Kenntniss der Taranteliden. (Archiv f. Naturgeschichte, 1880, jahrg. 46, bd. 1, p. 244–249, fig. 26 of pl. 10.)
Discussion of nomenclature. *G: D.* (1742)

de **Lafitte,** P. [Extrait de] L'œuf d'hiver du phylloxera aux Congrès viticole de Nîmes. (Comptes rendus, 15 Dec. 1879, v. 89, p. 1029.) *G: D.* (1743)

LeConte, J: Lawrence. The coleoptera of the alpine regions of the Rocky Mountains. (Bull. U. S. geol. and geog. surv. terr., 1878, v. 4, no. 2, p. 447–480.)
Specification of the peculiarly favorable opportunities presented by the elevated interior region of North America for the study of questions connected with geographical distribution of animals and plants; describes the following 1 n. g. and 42 n. sp.: 5 sp. of *nebria*, *pterostichus* (*cryobius*) *surgens*, *platynus jejunus*, *amara* (*curtonotus*) *cylindrica*, *harpalus clandestinus*, *bembidium bowditchii*, *b. scudderi*, *hydroporus congruus*, *gaurodytes nanus*, *geodromicus ovipennis*, *orobanus* (n. g. [*staphylinidae*], type: *o. simulator*), *o. simulator*, *scymnus nigripennis*, 15 sp. of *aphodius*, *anthaxia deleta*, *chrysobothris carinipennis*, *corymbites planulus*, *podabrus brevipennis*, *melyris atra*, *m. flavipes*, *crossidius allgewahri*, *neoclytus ascendens*, *glyptoscelis longior*, *chrysomela montivagans*, *magdalis alutacea;* synoptic table of the 4 sp. of *platynus* subg. *rhadine;* notes on other species; lists and distribution of the (more than 200) coleoptera collected by F: C. Bowditch at an elevation of 1800 metres and upwards, about 30 of which species are peculiar to the mountain region. List of (150) coleoptera collected at Atlanta, Idaho (2400 M.), by L. Allgewahr. Synoptic table to supplement that given by Horn in *Trans. amer. entom. soc.*, 1870, v. 3, p. 98, for determining the N. A. species of *nebria;* synoptic tables to exhibit the relations of the N. A. species of *nebria;* geographical distribution of the several N. A. groups of *nebria*. *B: P. M.* (1744)

Lichtenstein, Jules. Résistance des pucerons aux froids rigoureux. (Comptes rendus, 12 Jan. 1880, v. 90, p. 80–81.)
Abstract, entitled, "On the resistance of aphides to severe cold." (Annals and mag. nat. hist., April 1880, s. 5, v. 5, p. 344–345.) *G: D.* (1745)

Lichtenstein, Jules. On the resistance of aphides to severe cold. (Annals and mag. nat. hist., April 1880, s. 5, v. 5, p. 344–345.)
Abstract of J. Lichtenstein's "Résistance des pucerons aux froids rigoureux" (Comptes rendus, 12 Jan. 1880, v. 90, p. 80–81) [Psyche, Rec., no. 1745.] *G: D.* (1746)

Lichtenstein, Jules, *see* [*Lytta vesicatoria*] [Psyche, Rec., no. 1751.]

Liénard, Valère. Recherches sur le système nerveux des arthropodes. Constitution de l'anneau œsophagien. (Archives de biologie, 1880, v. 1, p. 381.)
The suboesophagean commissure, which has hitherto been considered special to the crustacea, is found in insects and myriapods. *A. R.* (1747)

[**Locust** swarms in Russia, India and Armenia.] (Amer. nat., Sept. 1879, v. 13, p. 600.) *G: D.* (1748)

Loman, J. C. C. Beiträge zur Kenntnis des anatomischen Baues der Geschlechtsorgane bei den Phalangiden. (Zool. Anzeiger, 23 Feb. 1880, jahrg. 3, p. 90–92.)
Summary of results obtained by study of *phalangium cornutum*, *p. urnigerum*, *p. parietinum*, and *leobunus rotundus*. *G: D.* (1749)

London purple. (Rural new yorker, 5 June 1880, v. 39, no. 23, p. 364, col. 3, 2 cm.)
Experience in the use of London purple in killing beetles; proportions of purple and plaster necessary to be effectual. *J. D. P.* (1750)

[**Lytta vesicatoria.**] Die Entwickelungsgeschichte des Spanischfliegen-Käfers. (Kosmos [Leipzig], Aug. 1879, bd. 5, p. 387–389, 65 cm.)
Germ. tr. of a paper by J. Lichtenstein ("Rev. internationale des sciences, Juin 1879"). Describes rearing of *l. vesicatoria* under artificial conditions. *G: D.* (1751)

McCracken, W. Bee enemies in Texas. (Amer. bee journ., 1879, v. 15, p. 355.)
Among the enemies are mentioned spiders, ants, bee-moths, horned lizards, and toads. *A. J: C.* (1752)

Macloskie, G: The proboscis of the house-fly. (Amer. nat., March 1880, v. 14, p. 153–161, 3 fig.)
Structure, functions, and homology of the parts of the proboscis of *musca domestica*. Homologizes the "pharynx" or fulcrum of the proboscis of diptera with the endocranium of other insects. *G: D.* (1753)

Mandibles of ants worn blunt by use. (Amer. nat., Sept. 1879, v. 13, p. 596.)
From *Psyche advertiser*, May–June 1879, p. 9. *G: D.* (1754)

March of the army worm (The). (Boston d. advert., 16 June 1880, no. 22404, v. 135, no. 145, p. [2], col. 2, 15 cm.)
Regions devastated by *leucania unipuncta*. *B: P. M.* (1755)

Maynard, C: J. A new species of butterfly from Florida. (Amer. nat., March 1873, v. 7, p. 177–178.)

Notes on butterflies of Florida; describes *lycaena modesta.* *G: D.* (1756)

Minot, C: Sedgwick. A sketch of comparative embryology. (Amer. nat., April 1880, v. 14, p. 242–249, 6 fig.)

Figure from Bobretzky [p. 247] to illustrate mode of segmentation of egg of *pieris crataegi.* *G: D.* (1757)

Mole, a plea for the. (Rural new yorker, 12 June 1880, v. 39, no. 24, p. 377, col. 1–2, 35 cm.)

The mole [*talpa*] stated to be more useful than injurious, by destroying noxious insects. *J. D. P.* (1758)

Monell, Joseph, *see* RILEY, C: V. *and* J. MONELL, Notes on the *aphididae* of the United States, . . . [PSYCHE, Rec., no.].

Morehouse, G. W. The structure of the scales of *lepisma saccharina.* (Amer. nat., Nov. 1873, v. 7, p. 666–669.)

G: D. (1759)

Mosquitoes. Interesting information for Florida colonists; some tall stories. ([N. Y. w.] sun, 10 Sept. 1879, v. 44, no. 2276, p. 2, col. 6, 13 cm.)

Intolerable attacks of mosquitoes [*culex?*], unless the insects are kept away by netting or smoke. *B: P. M.* (1760)

Müller, Albert. Moritz Isenschmid's Zusätze zu "Kaltenbach, Die Pflanzenfeinde aus der Klasse der Insekten," Stuttgart, 1874, 8°., mit den Belegstücken seiner Sammlung, Nat. Mus. Bern, verglichen und hrsg. von Albert Müller. (Mitth. Schweiz. entom. Gesells., 1880, v. 5, no. 10, p. 575–576.)

Separate, Bern, 20 Feb. 1880, p. 575–576, 24 × 15, t 17 × 10.3.

List of 37 coleoptera found on 19 plants. *B: P. M.* (1761)

Müller, Fritz. *Epicalia acontius.* Ein ungleiches Ehepaar. (Kosmos [Leipzig], Jan. 1879, bd. 4, p. 285–292, 272 cm., fig. 1–6.)

Discusses sexual dimorphism. *G: D.* (1762)

Müller, Fritz. *Ituna* und *thyridia.* Ein merkwürdiges Beispeil von Mimicry bei Schmetterlingen. (Kosmos [Leipzig], May 1879, bd. 5, p. 100–108, 310 cm., 4 fig.)

Figures wings of two Brazilian butterflies, *ituna ilione* and *thyridia megisto,* which mimic each other closely; discussion of mimicry in lepidoptera. *G: D.* (1763)

Müller, Fritz *and* Hermann **Müller.** Phryganiden-Studien. (Kosmos [Leipzig], Feb. 1879, bd. 4, p. 386–396, 400 cm., 3 il.)

Comparison of the lepidoptera and the *phryganidae,* with a view to their ancestral relationship. Brazilian phryganid-larvae which live in the tops of trees in the water collected by the leaves of bromeliaceous plants. Larval cases, or "*grumicha,*" of a Brazilian phryganid. Comparison of larval cases of phryganids with those of lepidoptera. *G: D.* (1764)

Müller, Fritz. Schützende Färbung und die Farbenempfindung der Thiere. (Kosmos [Leipzig], April 1879, bd. 5, p. 62–63, 42 cm.)

Protective coloration shows that some animals can distinguish color. *G: D.* (1765)

Müller, Hermann, *see* MÜLLER, Fritz *and* Hermann MÜLLER, Phryganiden-Studien [PSYCHE, Rec., no. 1764].

Müller, Hermann. In Blumen gefangene Falter. — Fleischfressende Honigbienen. (Kosmos [Leipzig], Oct.–Dec. 1879, bd. 6, p. 225–226, 33 cm.)

Quotes a letter from A. S. Packard, *jr.*, concerning capture of insects by *physianthus albens,* and comments upon the subject. *G: D.* (1766)

Müller, Hermann. Hesperiden-Blumen Brasiliens. (Kosmos [Leipzig], March 1879, bd. 4, p. 481–482, 18 cm.)

Observations recorded by Fritz Müller seem to support the idea that the blue and violet flowers may be especially often fertilized by crepuscular insects, since blue and violet are especially distinct by twilight. *G: D.* (1767)

Müller, Hermann. Ein Käfer mit Schmetterlingsrüssel. (Kosmos [Leipzig], Jan. 1880, bd. 6, p. 302–304, 79 cm., il.)

Figures a *nemognatha* from Brazil, and its mouth-parts, in which the maxillae are modified to form a hollow proboscis; compares this modification with the mouth-parts of *n. chrysomelina* from France. *G: D.* (1768)

Müller, Hermann. Koelreuter und Sprengel. (Kosmos [Leipzig], Aug. 1879, bd. 5, p. 402–404, 78 cm.)

Contains notes on the history of the knowledge of fertilization of flowers by insects. *G: D.* (1769)

Müller, Hermann. Schützende Aenlichkeit einheimischer Insekten. (Kosmos [Leipzig], Oct.–Dec. 1879, bd. 6, p. 29–39, 114–124, 800 cm., 5 fig.)

Discusses mimicry. Figures *calocampa exoleta,* larva of *eugonia alniaria,* pupal cases of *cionus scrophulariae* and the seed-capsules of *scrophularia nodosa,* brood-cells of *anthidium strigatum,* and larva of *stauropus fagi.* *G: D.* (1770)

Muth, C: F. Foul-brood, its cure. (Amer. bee journ., 1879, v. 15, p. 502.)

The salicylic acid cure is described. *A. J: C.* (1771)

New French silk (A). (Science advocate [Atco, N. J.], Jan. 1880, v. 1, no. 1, [p. 4], col. 1–2, 16 cm.)

On *attacus cynthia.* *G: D.* (1772)

[**New York** microscopical society, Proceedings of.] (Amer. m. micros. journ., Jan. 1880, v. 1, p. 19, 5 cm.)

Notice of address given before the society, 17 Oct. 1879, by J. D. Hyatt, on "The mechanism of insect-stings." *G: D.* (1773)

Noel, Paul. Amélioration du vase au cyanure. (Feuille des jeunes naturalistes, June 1880, an. 10, p. 107.)

A contrivance by which the potassic cyanide [KCN] in a collecting-tube is kept in slow decomposition by the vapor of vinegar. *G: D.* (1774)

Nylander, W. De l'ouïe chez les *anobium.* (Feuille des jeunes naturalistes, May 1880, an. 10, p. 92–93.)

Delicate hearing of *anobium* and the mode in which the beetle makes its rapping noise. *G: D.* (1775)

Osborn, Herbert. A destructive borer. (College quart., May 1880, v. 3, no. 1, p. 12, col. 1–2, 24 cm.) (Western stock journ. and farmer, June 1880, v. 10, no. 6, p. 125, col. 1–2, 32 cm.)

Description and figure of a large caterpillar found among chips of red oak, and supposed to be *xyleutes robiniae*, Peck. *J. D. P.* (1776)

Osborn, Herbert. [Habits of *lachnosterna fusca.*] (College quart., May 1880, v. 3, no. 1, p. 13, col. 2, 1 cm.) (Western stock journ. and farmer, June 1880, v. 10, no. 6, p. 125, col. 2, 9 cm.) *J. D. P.* (1777)

Osborn, Herbert. [*Trochilium denutatum* destructive to ash trees, *fraxinus.*] (College quart., May 1880, v. 3, no. 1, p. 14, col. 2, 3 cm.) *J. D. P.* (1778)

Paaren, N. H. Scab in sheep. (Prairie farmer, 5 June 1880, v. 51, no. 23, p. 181, col. 3–4, 37 cm.)

Scab in sheep caused by *acari;* methods of treatment. *J. D. P.* (1779)

Packard, Alpheus Spring, *jr.* A poisonous centipede. (Amer. nat., Aug. 1879, v. 13, p. 527.)

Abstract. (Science advocate [Atco, N. J.], Jan. 1880, v. 1, no. 1, [p. 4,] col. 2, 4 cm.)

Notes *cermatia forceps* from Providence, R. I. *G: D.* (1780)

Packard, Alpheus Spring, *jr.* The Rocky Mountain locust in New Mexico. (Amer. nat., Sept. 1879, v. 13, p. 586.)

Northern half of New Mexico and probably northern Arizona are subject to occasional invasions of *caloptenus spretus;* dates of several invasions. *G: D.* (1781)

Perty, Maximilian. Moritz Isenschmidt, Nekrolog. (Abhandlungen d. naturforschenden Gesellschaft in Bern aus d. J. 1878, 1879, p. 187–193.)

M. Isenschmidt was b. 5 Nov. 1850 in Könitz, near Bern, Switzerland; d. 21 Oct. 1878, in Bern. *G: D.* (1782)

[**Poletajew,** N.] Die Flugmuskeln der Lepidopteren und Libelluliden. (Zool. Anzeiger, 3 May 1880, jahrg. 3, p. 212–213.)

Abstract of a paper by N. Poletajew before the zoological section of the sixth assembly of Russian naturalists and physicians. *G: D.* (1783)

Ravages of the army worm. (Boston d. advert., 29 June 1880, no. 22415, v. 135, no. 156, p. 1, col. 6^7, 3 cm.)

Invasion of Portsmouth, N. H., and vicinity by *leucania unipuncta;* "in farming districts ditching proves to be the only effectual means of staying their progress." *B: P. M.* (1784)

Riley, C: Valentine *and* Joseph **Monell.** Notes on the *aphididae* of the United States, with descriptions of species occurring west of the Mississippi. (Bull. U. S. geol. and geog. surv. terr., 28 Feb. 1879, v. 5, no. 1, p. 1–32.)

Rev., entitled, "American aphides." (Nature, 24 April 1879, v. 19, p. 585, 6 cm.)

Part 1, p. 1–17. Biological notes on the *pemphiginae*, with descriptions of new species, by Riley. "Full account of" *schizoneura americana* n. sp. and *colopha ulmicola*, "with less complete accounts of" *hormaphis spinosus*, *pemphigus populimonilis* n. sp., *p. populitransversus* n. sp., *p. populiramulorum* n. sp., *p. acerifolii* n. sp., *p. fraxinifolii* n. sp.

Part 2, p. 18–32. Notes on *aphidinae*, with descriptions of new species, by Monell. Describes 9 new species of *siphonophora*, 5 of *aphis*, 2 of *rhopalosiphum*, 9 of *callipterus*, 3 of *chaitophorus*, other species of these genera and of *drepanosiphum* and the genera themselves, with synoptic tables for distinguishing some of the species. *B: P. M.* (1785)

Schaupp, Frank G: [Coleoptera wanted.] (Bull. Brooklyn entom. soc., May 1878 [v. 1], p. 8.)

List of 7 *cicindela*, 3 *nomaretus*, 10 *cychrus* which the author wishes to obtain by purchase or exchange. *B: P. M.* (1786)

Schindler, Emil. Beiträge zur Kenntniss der Malpighi'schen Gefässe der Insecten. Inauguraldissertation zur Erlangung der Doctorwürde vorgelegt der hohen philosophischen Facultät der Universität Leipzig. Mit 3 Tafeln und 1 Holzschnitt. Leipzig, W. Engelmann, 1878. t.-p. cover + 76 [+ 1] p., pl. 38–40. 24 × 15, t 18 × 10.7.

From the *Zeitschr. f. wiss. Zool.*, v. 30, heft 4. General; historical; minute and grosser anatomy of the malpighian vessels in the different orders of insects; final remarks in which the view that the malpighian vessels are urinary organs is defended, and their surface in relation to the weight of the body of the insect is discussed. Figures the malpighian vessels or their parts, in *lepisma saccharina*, *periplaneta europaea*, *p. orientalis*, *mantis religiosa*, *gryllotalpa vulgaris*, *acheta campestris*, *decticus*, *perla bicaudata*, *ephemera vulgata*, *phryganea flavicornis*, *dromius*, *cryptocephalus sericeus*, *rhagonica fulva*, *melolontha vulgaris*, *tenebrio molitor*, *geotrupes sylvestris*, *lophyrus pini*, *ophion*, *tettigonia viridis*, *haltica nemorum*, *formica rufa*, *lygaeus equestris*, *culex pipiens*, *eristalis tenax*, *e. floreus*, *sarcophaga carnaria*, *papilio machaon*, *cossus ligniperda*, *pontia brassicae*, larva of *euprepia*, *hyponomeuta evonymella*, *euprepia caja*, and *sphinx convolvuli.* *G: D.* (1787)

Scudder, S: Hubbard. An account of some insects of unusual interest from the tertiary rocks of Colorado and Wyoming. (Bull. U. S. geol. and geog. surv. terr., May 1878, v. 4, no. 2, p. 519–543.)

Separate, with t.-p. cover, Wash., 3 May 1878, p. 519–543, 23 × 15, t 19 × 11.2.

Notice. (Neues Jahrbuch für Mineralogie, Geologie und Palaeontologie, . . . G. Leonhard und H. B. Geinitz, 1878, p. 970.)

Describes the following genera and species, all new except the phryganid genus *indusia: prodryas persephone* [*nymphalidae*], *palembolus florigerus* [*hirmoneuridae*], *parolamia rudis* [*cerambycidae*], *petrolystra gigantea* [*aphrophorina*], *p. heros*, *lithymnetes guttatus* [*phyllophoridae*], *dysagrion fredericii* [*agrionina*], egg-masses of *corydalites fecundum* [*sialina*], *holcorpa maculosa* [*panorpidae*], larva-cases of *indusia calculosa.* *B: P. M.* (1788)

Scudder, S: Hubbard. The early types of insects: or the origin and sequence of insect life in palaeozoic times. (Mem. Bost. soc. nat. hist., March 1879, v. 3, p. 13–21.)

Abstract. (Science news, 15 Nov. 1878, v. 1, p. 22–23.)

Notice. (Sci. amer., 23 Nov. 1878, v. 39, p. 330.)

Abstract. (Amer. journ. sci. and arts, Jan. 1879, s. 3, v. 17, p. 72–74.)

Germ. tr. of the abstract in Amer. journ. sci. and arts, under the title "Die Urtypen der Insekten." (Kosmos [Leipzig], April 1879, bd. 5, p. 61–62, 51 cm.)

Notice, entitled, "The early types of insects." (Nature, 24 April 1879, v. 19, p. 584, 5 cm.)

General considerations drawn from a study of palaeozoic insects. Abstracts were published before the memoir. *G: D.* (1789)

Scudder, S: Hubbard. The fossil insects of the Green River shales. (Bull. U. S. geol. and geog. surv. terr., Dec. 1878, v. 4, no. 4, p. 747–776.)

Separate, with t.-p. cover, Wash., 1878 [2 Jan. 1879], 29 p., 23 × 15, t 19 × 11.2.

Notice. (Amer. nat., Feb. 1879, v. 13, p. 132.)

Describes as new genera: *stenocinclis* [*asilidae*], *poliomyia* [*myopidae*], *lithopsis* [*fulgoridae*]; describes 4 hymenoptera, 16 diptera, 24 coleoptera, 15 heteroptera, 7 homoptera, 1 orthopteron, 2 pseudoneuroptera, 3 arachnida, 1 myriapod, with notes on others. *B: P. M.* (1790)

[**Squash-bugs,** *coreus tristis*, destroyed by soot, ashes or dust sprinkled on the vines while moist.] (Western stock journ. and farmer, June 1880, v. 10, no. 6, p. 124, col. 4, 2 cm.) *J. D. P.* (1791)

Thomas, Cyrus. On the orthoptera collected by *Dr.* Elliott Coues, *U. S. A.*, in Dakota and Montana, during 1873–74. (Bull. U. S. geol. and geog. surv. terr., May 1878, v. 4, no. 2, p. 481–501.)

List of 25 species of *acrididae*, *locustidae*, and *gryllidae* found near the boundary line between the U. S. and Canada; classificatory and other notes, and especially a note (p. 485–501) on *caloptenus spretus*, its breeding places, migrations, ravages, and means against it. *B: P. M.* (1792)

Trelease, W: Carnivorous habits of bees. (Amer. nat., May 1880, v. 14, p. 363.)

Cites references upon the above subject. *G: D.* (1793)

Trelease, W: On the fertilization of *symplocarpus foetidus*. (Amer. nat., Sept. 1879, v. 13, p. 580–581.)

Regards *apis mellifica* the chief agent in the fertilization of the skunk cabbage; notes *ips fasciatus* and other insects in the spathes. *G: D.* (1794)

de **Troostembergh,** Max. Longévité chez les insectes. (Feuille des jeunes naturalistes, May 1880, an. 10, p. 93.)

Specimens of *limonius* lived 50 days without nourishment, glued upon a tablet, and in air saturated with naphthalin. *G: D.* (1795)

Turner, H: *Belostoma* [*corr.*] piscivorous. (Amer. nat., Nov. 1879, v. 13, p. 710–711.)

Belostoma kills *gasterosteus* and sucks its blood. *G: D.* (1796)

Uhler, Philip Reese. On the hemiptera collected by *Dr.* Elliott Coues, *U. S. A.*, in Dakota and Montana, during 1873–74. (Bull. U. S. geol. and geog. surv. terr., May 1878, v. 4, no. 2, p. 503–512.)

List of 59 species, with localities; *jassus twiningi* and *deltocephalus configuratus* described as new species. *B: P. M.* (1797)

Uhler, Philip Reese. On a remarkable wasp's nest found in a stump, in Maryland. (Amer. nat., Nov. 1873, v. 7, p. 678–679.)

Reprint. (Proc. Amer. assoc. advanc. sci., 1873 [1874], v. 22, pt. 32–34.)

Review, by C: V. Riley, entitled, "The habits of *polistes* and *pelopaeus*" [*sic*]. (Amer. nat., 1874, v. 8, p. 229–231.)

Description of the clay nest of a species of *polistes* [?], and the process of its construction. *G: D.* (1798)

Urtypen der Insekten (Die). (Kosmos [Leipzig], April 1879, bd. 5, p. 61–62, 51 cm.)

Germ. transl. of an abstract (Amer. journ. sci. and arts, 1879, s. 3, v. 17, p. 72–74) of S: H. Scudder's "The early types of insects: . . ." (Mem. Bost. soc. nat. hist., 1879, v. 3, p. 13–21) [Psyche, Rec., no. 1789]. *G: D.* (1799)

Useful and destructive insects. (Journ. applied sci., April 1880, v. 11, p. 60, 11 cm.)

Subjects for discussion at the exhibition of the Central Agricultural and Entomological Society of France. *G: D.* (1800)

Vogel, Friedrich Wilhelm. Die Honigbiene und die Vermehrung der Bienenvölker nach den Gesetzen der Wahlzucht sowie vollständige Anleitung zur rationell-naturgemässen und einträglichen Pflege der Biene in Körben, Beuten und Dzierzon'schen Wohnungen. Mit 135 . . . Holzschnitten. Mannheim, J. Schneider, 1880. t.-p. cover + 10 + 409 p., 25 × 16, t 16 × 11. 9 M.

An illustrated general work on apiculture. Part i, the hive; ii, the establishment of the bee-household; iii, selective breeding in general; iv, practical bee-raising. *G: D.* (1801)

Warbles in cattle. (Rural new yorker, 12 June 1880, v. 39, no. 24, p. 379, col. 3, 10 cm.)

Tumors caused by *oestrus bovis*; remedy. *J. D. P.* (1802)

Ward, Lester F. Sexual differentiation in *epigaea repens*. (Amer. nat., March 1880, v. 14, p. 198–200.)

Epigaea probably fertilized by ants. *G: D.* (1803)

What it costs to feed insects. (Sci. amer., 17 March 1877, v. 36, p. 160, col. 2, 33 cm.)

Statistics from Packard, Riley and others. Advocates salaried state and national entomologists, a weekly entomological bulletin, and reports upon insect migrations and related topics by the Weather Signal Bureau. [Title cited in Psyche, Rec., no. 865*c*.] *G: D.* (1804)

ENTOMOLOGICAL ITEMS.

Sir J: Lubbock has received specimens of Australian ants which have a very much distended abdomen, so that the ant serves as an animated honey-pot.

The mystery of *Prosopistoma punctifrons* is solved. Dr. Joly and Mr. Vayssiere have reared it and find that it is an ephemerid, as has been supposed. It has also been supposed to be a crustacean, and again to be the larva of a parnid beetle.

The Michigan State Pomological Society has, at the suggestion of Prof. A. J. Cook, offered two prizes, the first of fifty dollars, and the second of twenty-five, to be given to the neighborhood that shows most skill, thoroughness, and secures best results in destroying the coddling moth.—*Amer. naturalist*, June 1880, v. 14, p. 470.

Authors who desire to enlarge any numero of Psyche in order to accommodate longer articles by them than are regularly accepted by the editors for publication, can do so at a cost of $6.50 for each 4 pages of Long-Primer reading matter, or fraction thereof. This offer is in no way intended to extend admission to articles of a nature unsuitable for publication in Psyche, such as descriptions of new species, or lists of insects from special localities.

M. Paul Noel describes two modes of collecting coleoptera in the May numero of the *Feuille des jeunes naturalistes*. To capture some of the *carabidae* he strews earthworms, cut in small pieces, about loose rocks or boards near moist roads. After the beetles have eaten their fill, during the night, they secrete themselves under the boards or rocks, where they may be easily collected the next morning. To capture *Geotrupes* and *staphylinidae* M. Noel puts the excrement in which they live in a tub of water, and, after thorough stirring, the beetles float to the top, while the refuse mostly sinks. The beetles can be easily gathered from the surface with a sieve, a few grams of ether having been added to the water, if they are so numerous as to be liable to escape. This mode of collecting will be applicable to insects not mentioned by M. Noel, *e. g.*, to beetles in bark and fungus, by using forced submersion.

SOCIETY MEETINGS.

The regular meetings of the Cambridge Entomological Club will be held at 19 Follen St., at 7.45 p. m., on the days following:—

8 Oct. 1880.
12 Nov. „
10 Dec. „
14 Jan. 1881.
11 Feb. „
11 Mar. 1881.
8 Apr. „
13 May „
10 June „

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following:—

27 Oct. 1880.
24 Nov. „
22 Dec. „
26 Jan. 1881.
23 Feb. 1881.
23 Mar. „
27 Apr. „
25 May „

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following:—

8 Oct. 1880.
12 Nov. „
10 Dec. „
14 Jan. 1881.
11 Feb. „
11 Mar. 1881.
8 Apr. „
13 May „
10 June „

James H. Ridings, *Recorder.*

The semi-annual meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following:—

13 Dec. 1880.
13 June 1881.

James H. Ridings, *Recording Secretary.*

The regular monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following:—

7 Sept. 1880.
5 Oct. „
2 Nov. „
7 Dec. „
4 Jan. 1881.
1 Feb. „
1 Mar. „
5 Apr. „

G: H. Bowles, *Secretary.*

PRIZE ESSAYS.

Due 15 Oct. 1882.—Life-histories of *Sclerostoma syngamus* and of *Strongilus pergracilis*. See Psyche, v. 3, p. 59.

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VI. Jahrg. 1880.

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PSYCHE,

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

[Established in 1874.]

EDITED BY

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ALBERT J: COOK, *Lansing, Mich.;* CLIFFORD CHASE EATON,
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Davenport, Iowa.

Vol. 3. No. 76.

AUG. 1880.

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PSYCHE.

THE TROPHI AND THEIR CHITINOUS SUPPORTS IN *GRACILARIA*.

BY GEORGE DIMMOCK, CAMBRIDGE, MASS.

The papers upon *Lithocolletis* by Mr. V. T. Chambers, which have appeared from time to time in Psyche,[1] supplemented by the notes and figures on the same subject contained in his address as retiring president of the Cincinnati Society of Natural History,[2] inspired me with the desire to study further the mouth-parts of the larvae of Tineina, especially in their earlier stages. The abundance of *Gracilaria syringella* in the leaves of the lilac (*Syringa vulgaris*), about Leipzig this summer, gave me plenty of material, and the opportunity of studying the larvae under the direction of Professor Leuckart was not lost.

Altho the larvae were so numerous in some of the gardens about Leipzig that scarcely a leaf of the lilac escaped their depredations, I attempted to learn but little of their mode of life. During their early stages, when they have the flattened larval form, they mine in the upper side of the leaf. They then have the form of head and mouth-parts represented in fig. 2, and their legs are mere rudiments. A little later they assume the form of head and mouth-parts shown in fig. 3, and begin to eat away all the parenchyma of the leaf, leaving only the upper and lower epidermis; still later they leave the mines and roll the ends of the leaves, feeding within the rolls. Upon changing the form of mouth-parts from that represented in figure 2 to that represented in fig. 4, true legs are developed, the secretion of silk is begun, and the larvae become more cylindrical. A striking resemblance to the changes which Mr. Chambers has observed in the cylindrical larvae of *Lithocolletis* is observed in the above-mentioned changes of the larvae of *Gracilaria*. Often as many as ten or fifteen larvae are found in a single blotch on the leaf. I succeeded in rearing the larvae easily by simply transferring leaves containing them to a box, in which I packed many leaves closely together. The leaves, thus packed, retained moisture and the larvae deserted the mines to wander about between the leaves, where they fed until ready for pupation. I am indebted to Professor Zeller, for the determination of the species of *Gracilaria* which I have had under observation.

---

[1] Psyche, Nov.–Dec. 1877 [April 1878], v. 2, p. 81–87; May–Aug. [Nov.] 1878, v. 2, p. 137–153; April 1879, v. 2, p. 227.

[2] Journ. Cincinnati Soc. Nat. Hist., July 1879, *also* Separate, 22 p. [Psyche, Rec., no. 1805.]

In order to make the structure of the trophi and the arrangement of their chitinous supports more clear, I have prepared fig. 2–4, to accompany the following description.

The head of the early form (fig. 2) is much flattened. It has, upon its dorsal surface, two stout chitinous supports, which pass anteriorly to a point above the labrum, where they nearly meet, then turning laterally and ventrally, at nearly right angles to their previous direction, they join with other chitinous supports to form the sockets of the mandibular joints. Posteriorly these two dorsal supports (the anterior portions of which are not seen in fig. 2) approximate slightly and are connected by a transverse support (fig. 2, *e*) ; rapidly diverging again they join the ring which passes around the posterior portion of the head (fig. 2, *f*, *m*, *g*). From the lateral portions of this ring there passes forward, on each side, a support (fig. 2, *a*), which turns suddenly inward and ventrally behind the antenna (fig. 2, *p*), and helps to form the socket of the joint of the mandible. About half way between the lateral supports (fig. 2, *a*) and the middle of the ventral portion of the head, on each side, there passes forward from the ring which surrounds the posterior portion of the head another support (fig. 2, *b*), which also helps to form the socket of the mandibular joint. From the points where the last-mentioned supports join the posterior ring, supports (fig. 2, *d*) pass anteriorly and obliquely toward the dorsal side of the head, joining the dorsal supports about midway between *e* and the labrum.

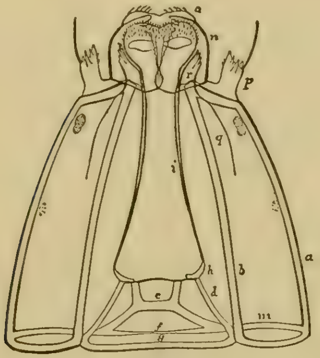

Fig. 2. — Ventral view of the head of *Gracilaria syringella* in its early larval stages : *o*, labrum ; *n*, mandible ; *r*, maxilla ; *p*, antenna ; *a*, *b*, *d*, *e*, *f*, *g*, *h*, *i*, *m*, chitinous supports explained in the text ; *q*, depression between the basal support of the maxilla and the ventral surface of the head.

The labrum of the early form (fig. 2, *o*) is supported beneath the divergent anterior extremities of the dorsal chitinous supports of the head in such a manner as to be capable, not only of some protrusion and retraction, but also of a slight lateral motion. The labrum is bilobed, each lobe bearing five incurved spines, and has a very delicate grooving (fig. 3, *o*).

The mandibles of the early form (fig. 2 and 3, *n*) are strongly chitinized. They are of a generally triangular form, strongly rounded on the outer side and toothed on the inner side. Two prominent apical teeth are followed by a number of smaller ones. On the under-side of each mandible, near the middle of the proximal end, is a rounded protuberance, which fits into a socket formed by the union of the supports *a* and *b* with the laterally divergent anterior portions of the dorsal supports of the head, thus forming the mandibular joint. The pinniform extensor muscles of the mandibles have their insertion on the exterior proximal angle of each mandible and their origin on the chitin supports *a* and *b*. The broadly pinniform flexor muscles of the mandibles have their insertion on the interior proximal angle of each mandible, and their origin on the chitinous supports *a* and *m* and on those which pass anteriorly and posteriorly from the support *e;* they thus lie dorsally and the extensors ventrally. The mandibles are directed exactly anteriorly, in the axis of the body; and not ventrally.

The maxillae (fig. 2 and 3, *r*) and the labium (fig. 3, *v*) in the early form are attached to a common protrusile basis, the limits of which are partly indicated at *q* (fig. 2). The maxillae are very rudimentary, but that they are maxillae is shown by their being cleft, for if they were labial palpi they would not be cleft, but would probably be jointed. Further, as nearly as could be determined from a number of larvae found in the act of molting, at the time when they pass from the earlier to the later form, the maxillae of the later form were drawn from the skins of these cleft appendages. In still further support of the view that these mouth-parts are maxillae is their position, which is with their apical extremities slightly above the level of the labium, as can easily be seen by careful focusing with a high-power objective. The maxillae of the early form, then, are only lateral, outwardly-curved processes, each side of, and attached to the same support as the labium.

The labium of the early form (fig. 3, *v*) is bilobed, with a few delicate grooves and thickenings, and is covered distally with a rasp of fine spines. It can be protruded, together with the maxillae, beyond the extremities of the mandibles, and has a slight lateral motion. No traces of a spinneret are visible in the early form of larvae.

The support common to the maxillae and labium consists of two chitinous rods (fig. 2, *i*) passing posteriorly, diverging slightly, and then suddenly curving inward. The support is retracted by a muscle between the posterior ends of these chitinous rods (fig. 2, *h*) and a part (fig. 2, *g*) of the ring at the posterior portion of the head. I was unable to discover any opposing muscle, and I think the labio-maxillary support is protruded by the action of the fluids of the head.

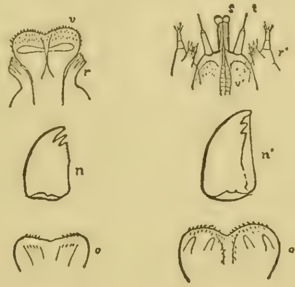

FIG. 3. — Comparison of the separated mouth-parts of the early and later larval stages of *Gracilaria syringella: v, v'*, labium of each form; *t*, labial palpus of later form.

After the molting by which the larva enters upon its later or more cylindrical stages, the head becomes broader and thicker in proportion to its length, a few hairs appear on its anterior portions, the mouth-parts are directed a little ventrally from the axis of the body (fig. 4), and the condition of the trophi and their supports is as follows: —

The chitinous supports of the parts of the head are somewhat modified from what they were in the early form of larva, altho they are only a further elaboration of the same plan. The support *e* (fig. 2) has become so reduced that the dorsal supports appear simply to cross one another (fig. 4, *e*). The supports which pass anteriorly from *e* have united at their ends to form a clypeus (not shown in the figure). The support *f* (fig. 2), which was slender in the early form, has entirely disappeared. The supports *a* and *m* remain essentially the same as they were in the early form, but *b*, which at first united almost directly with *d*, has become separated from it, to allow of the interposition of a support *c*, which passes forward and unites, at *l*, with a branch (*k*) from *b*, the whole portion at *l* serving as attachment for a muscle to extend the labium and maxillae. The chitinous supports of the labium and maxillae have changed, as will be seen later.

The labrum (fig. 4, *o*; fig. 3, *o′*) has nearly the same outline as in the early form. The anterior portion, especially in the very last larval stage, is beset with hairs. It has two oblique thickenings in each lobe, and a **Y**-shaped thickening through the middle. The labrum is protrusile, retractile, and slightly movable laterally, as in the early form.

The mandibles (fig. 4, *n*; fig. 3, *n′*) have characters similar to those which they had in the early form. The small teeth are, however, absent, and, in their place, a ridge extends along the under side of the mandible from the large apical teeth to the base. The origin and insertion of the extensor and flexor muscles are on places corresponding to their origin and insertion in the early form.

The maxillae in the later form (fig. 4, *r*; fig. 3, *r′*) have undergone considerable change in their appearance from that in the early form. They are now of the form common to lepidopterous larvae — an outward jointed portion, the maxillary palpus, and a double inner jointed portion, the maxilla proper.

The labium (fig. 3, *v′*) has, in the later form, developed a pair of jointed labial palpi and a tubular spinneret. The proximal portion is hairy. Not only the spinneret, but also the labium itself, can be turned under, so that the labial palpi are directed posteriorly. The position shown in fig. 3 is with extended labium; in fig. 4, with labium folded back.

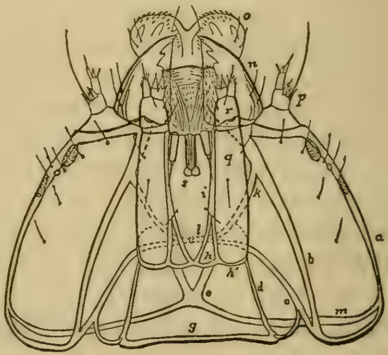

Fig. 4. — Ventral view of the head of *Gracilaria syringella* in its later larval stages: *s*, spinneret; other letters as in fig. 2, or explained in text.

The supports which bore the labium and maxillae in the early stages (fig. 2, *i*) are greatly modified in the later stages. The support *i* (fig. 4) divides posteriorly into two parts, between the ends of which extends a support, *h* (fig. 4). The slightly developed line of demarcation between the maxilla and the under surface of the head (fig. 2, *q*) has become a clearly defined line, and the whole supporting framework of the labium and maxillae approaches a rectangular form, limited posteriorly by chitinous supports (fig. 4, *h*, *h′*). Muscles extend from these chitinous supports, *h*, *h′*, anteriorly to the chitinous rod *l* and posteriorly to the rod *g*. The action of these muscles protrudes or retracts the framework of the labium and maxillae, but, while the maxillae are simply pushed forward by this action, the labium is unfolded, or unrolled, so as to assume the position shown in fig. 3, *v′*.

If the form of the trophi in *Gracilaria syringella*, in its early larval stages, be compared with the form in the later larval stages, the modification of each part will be seen to increase in amount as the distance from the anterior part of the head increases, that is, the mandibles change more than the labrum, the maxillae more than the mandibles, and the labium most of all. By comparing, on fig. 3, the mouthparts of the early and later forms, the changes of the labrum are seen to be mostly in markings, and in the number of hairs or spines; the changes of the mandible have been, to a slight extent, modifications of form; the maxillae, while they existed before, are greatly modified in the later form; the labium most of all seems to have added to its structure and functions. This increase of complexity of the mouthparts toward the labium, which becomes more and more striking at each successive stage in many insects, is probably coordinate with the relations which these parts have to the surfaces on which the larvae walk, from which they feed, and, in many cases, on which they spin their silk.

This successive development of organs coordinate with their functions is well exemplified in the larvae of *Gracilaria*, of *Lithocolletis*, of *Phyllocnistis*[3] and possibly of other Tineina, in which the early form of the larva is so different from its later form. In *Gracilaria syringella*, so long as the larvae feed only in a plane surface, and do not spin, no great difference is visible between the mouth-parts above the mandibles and those below them. Both labrum and labium exercise their simplest functions of pushing the food between, and keeping it subject to the action of the mandibles, and, perhaps, of sawing it out of the parenchyma by a lateral motion. But contemporaneous with the appearance of the later form of larval trophi, — the labium capable of turning under, and the better developed maxillae — the larva, now having its mandibles directed slightly ventrally, acquires the power of eating vertically to the surface of the leaf, and of spinning threads in all directions. At the same time its feet are developed, later it eats out from its mine, and becomes free. An externally well-differentiated dorsal and ventral surface seems to have been acquired from the time when the larva ceased to be pressed dorsally and ventrally between the upper and lower epidermis of its mine.

I have not had the opportunity to compare, by microscopic work, the larva of *Gracilaria syringella* with other larvae of Tineina; therefore the above observations may be regarded as quite incomplete.

Leipzig, 15 Aug. 1880.

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[3] Psyche, May [July] 1880, v. 3, p. 67.

PSYCHE.

CAMBRIDGE, MASS., AUG. 1880.

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PROCEEDINGS OF SOCIETIES.

ENTOMOLOGICAL SECTION OF THE ACADEMY OF NATURAL SCIENCES, PHILADELPHIA, PA.

[*Abstract from the* Monthly proceedings, *concluded from page* 89.]

9 MAY 1879. — Mr. McCook described and figured [Proc., p. 11, fig. 1, 2] a nest of *Tarentula tigrina* n. sp., from New Jersey. Dr. G: H: Horn remarked upon *Cantharis deserticola, Mycetina limbata, Dasycerus sulcatus, Adelops hirtus* and *Sarpedon scabrosus;* also upon the classification of the *nitidulidae* and the *monotomidae;* he thought the latter family would probably have to be reunited with the *lathridiidae.* — p. 9–13.

9 JUNE 1879. — Mr. C: A. Blake exhibited some rare lepidoptera; also an *Actias luna* ♂ having an ocellus on the left fore wing, midway between the usual discal spot and the apex, and about 3 mm. beneath the costal margin, and having some of the colors on the wing suffused; also an *A. luna* ♀, upon the wings of which the discal spots were irregular and the colors diffused; also a *Junonia lavinia* peculiarly colored. Mr. Blake remarked, with figures [Proc., p. 14], on the form and attachment of the wing-scales of some species of *Morpho* and *Hipparchia.* Dr. G: H: Horn communicated a table [Proc., p. 14–16] of the (13) North American species of *Adelocera,* with a list of changes and synonymy among the *elateridae.* Mr. E. T. Cresson described *Ibalia rufipes, I. montana,* and 6 species of *Pterochilus* from the western U. S., and *Aulacus pallipes* from Massachusetts, 9 n. sp. — p. 13–20.

12 SEPT. 1879. — Dr. G: H: Horn remarked upon the classification of the *eucnemidae,* with especial reference to *Cerophytum* and *Perothops,* "which should be excluded from the *eucnemidae* each to represent a sub-type of the greater elateride complex" including the *eucnemidae,* the *cebrionidae,* the *throscidae,* and the *elateridae* proper. Dr. Horn reviewed the *dascyllidae,* directing special attention to certain hitherto unnoticed characters in the related genera *Eubria* (which does not occur in our fauna), *Ectopria* [*Eurea*], *Dicranopselaphus* and *Acneus* n. g.; he also indicated the new genus *Placonycha,* of which *Dicranopselaphus edwardsii* is the type. Mr. H: C. McCook exhibited an artificial formicary containing living specimens of *Myrmecocystus mexicanus,* and described the nests and habits of the ants. He also remarked upon the habits and architecture of *Pogonomyrmex occidentalis.* Mr. E. T. Cresson described 5 new species of *Eucerceris* from New Mexico, Colorado and Nevada. — p. 21–25.

14 NOV. 1879. — Dr. J: L. LeConte remarked upon his paper, entitled, "Short studies on North American coleoptera." Mr. E. T. Cresson described 10 new species of *Metopius,* 8 from Nevada and Colorado, and 1 each from Florida and Maryland. Dr. G: H: Horn described a case of dimorphism in *Desmocerus auripennis* ♀, consisting in a different size of markings and a different fineness of punctuation of the elytra, and mentioned other instances of dimorphism in coleoptera, which occurs almost exclusively in the female sex. — p. 26–31.

8 DEC. 1879. — Dr. J: L. LeConte remarked upon the structural peculiarities of *Propalticus oculatus,* one of the *mycetophagidae* from the Hawaiian Islands. Dr. G: H: Horn described a deformity in the left anterior tarsus of *Cremastochilus saucius,* the last joint of which seemed to be triple, and alluded to the tendency of deformities to exist by triplication. Mr. E. T. Cresson described 7 new species of *Philanthus* from the western U. S. The following officers were elected for the year 1880: — *Director,* J: Lawrence LeConte; *Vice-Director,* G: H: Horn; *Recorder,* James H. Ridings; *Treasurer,* Ezra Townsend Cresson; *Conservator,* G: B. Cresson; *Publication Committee,* G: H: Horn, S: Lewis. — p. 31–34.

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [ ], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

Corrections of errors and notices of omissions are solicited.

Chambers, Vactor Tousey. Annual address of . . . President Cincinnati society of natural history. (Journn. Cinc. soc. nat. hist., July 1879, v. 2, no. 2, p. . . . , 1 pl.)

Separate, with t.-p. cover, Cincinnati, Ohio, 1879, 22 p., 1 pl., 22.5 × 15.5, t 17 × 10.6.

The metamorphoses of insects as illustrated in the tineid genus *lithocolletis* of Zeller. *G: D.* (1805)

Curculio, Padded mallets for the. (Cultivator and country gent., 3 June 1880, v. 45, no. 1427, p. 358, col. 3–4, 8 cm.)

Inefficiency of padded mallets as recommended by Prof. A. J: Cook in *N. Y. tribune;* recommends striking with an axe or stone-hammer on an iron plug set in the tree. *J. D. P.* (1806)

Currant worms. (Cultivator and country gent., 10 June 1880, v. 45, no. 1428, p. 376, col. 1, 9 cm.)

Directions for killing currant worms [*nematus*] by dusting the leaves with hellebore when the dew is on them. *J. D. P.* (1807)

Cyanide of potassium. (Science, 3 July 1880, v. 1, no. 1, p. 12, 7.5 cm.)

Directions for making the compound (K C N). *B: P. M.* (1808)

Cypriote bees and honey. (New remedies, July 1880, v. 9, p. 224, 5 cm.)

Efforts to be made to bring Cyprian bees, in large numbers, to America. *G: D.* (1809)

Darwin, C: Die geschlechtlichen Färbungen gewisser Schmetterlinge. (Kosmos [Leipzig], April 1880, bd. 7, p. 72–74, 72 cm.)

The change of color in *diadema bolina* and in a species of *apatura* when viewed from different directions, and the signification of this change. *G: D.* (1810)

Deschange, Émile. Le chlorure de calcium. (Feuille des jeunes naturalistes, April 1880, an. 10, p. 83.)

The author employs calcic chloride [Ca Cl$_2$] in boxes, in his collection of insects, to prevent damage by moisture. *G: D.* (1811)

Devereaux, Willard Loomis. Methods of destroying the tobacco worm. (Rural new yorker, 29 May 1880, v. 39, no. 22, p. 342–344, 52 cm.)

Habits of *macrosila carolina.* Recommends cultivation of *oenothera lamarckiana, o. biennis,* and *datura stramonium,* and capturing the moths attracted thereby. Methods of killing moths and picking the worms. Worms destroyed by turkeys and skunks. Possible benefit from yeast fungus remedy. Use of poisons not recommended. *J. D. P.* (1812)

Dodge, S. C. Monstrosities among bees. (Amer. bee journ., 1879, v. 15, p. 498.)

Many cases of so called hermaphroditism are given. Each insect is described in detail. *A. J: C.* (1813)

[**Eaton,** Alfred Edwin.] Early stages of *ephemeridae.* (Can. entom., Feb. 1880, v. 12, p. 40.)

Request for specimens. *G: D.* (1814)

Edwards, W: H: Ueber das Erziehen der Tagfalter aus Eiern [Psyche, Rec., no. 1584].

Reprint. (Entom. Nachrichten, 15 March 1880, jahrg. 6, p. 59.)

G: D. (1815)

Edwards, W: H: Migration of butterflies. (Can. entom., Feb. 1880, v. 12, p. 39–40.)

Quotes a letter by J. E. Willet, of Macon, Ga., in relation to migrations of *callidryas eubule* in Georgia and Alabama. *G: D.* (1816)

Edwards, W: H: On certain species of *satyrus.* (Can. entom., Feb. 1880, v. 12, p. 21–32; March 1880, v. 12, p. 51–55; April 1880, v. 12, p. 90–94; May 1880, v. 12, p. 109–115.)

Considers the varieties and geographical distribution of the U. S. species of *satyrus,* and divides the 12 species into 3 groups. Regards *s. alope* and *s. nephele* as dimorphic forms of *s. alope;* form *alope* with varieties *texana* and *maritima;* form *nephele* with variety *incana* and with subspecies *olympus* and *boopis.* *G: D.* (1817)

Edwards, W: H: Description of preparatory stages of *argynnis alcestis,* Edw. (Can. entom., April 1880, v. 12, p. 69–74.)

Describes egg, larva and chrysalis of *a. alcestis;* comparison with other species of *argynnis;* discussion of the question whether to call the head the first segment in describing lepidopterous larvae. *G: D.* (1818)

Edwards, W: H: Description of the preparatory stages of *grapta progne,* Cramer. (Can. entom., Jan. 1880, v. 12, p. 9–14.)

Describes egg, larva and chrysalis. *G: D.* (1819)

Electrical insects. (Science, 3 July 1880, v. 1, no. 1, p. 5, 8 cm.)

Reduvius serratus, an elaterid, and a large hairy lepidopterous caterpillar cause electric shocks upon being touched. *B: P. M.* (1820)

Emerton, James H: Breeding habits of spiders. (Amer. nat., Aug. 1880, v. 14, p. 595, 1 fig.)

Mode of sexual union in *xysticus.* *G: D.* (1821)

[**Entomological** society of Ontario.] At the Centennial. The exhibit of the Entomological society of Ontario, Canada. ([N. Y.] d. graphic, 26 Sept. 1876, v. 11, p. 594–595, il.)

Figures 14 species of insects. Organization of the Entom. Soc. Ontar., its officers and publications.
G: D. (1822)

Euphorbium as a protective of iron and steel. (Scientific amer. suppl., . . .) (New remedies, May 1880, v. 9, p. 145, 18 cm.)

Gum of *euphorbia* used in Africa to protect iron from rust and for protecting articles from white ants.
G: D. (1823)

Fabre, J. H. Souvenirs entomologiques: . . . [Psyche, Rec., no. 1588].

Rev. by C: Robert Osten Sacken, entitled, "Souvenirs entomologiques . . . (Entom. Zeitung . . . zu Stettin, April–June 1880, jahrg. 41, p. 136–138.)
G: D. (1824)

Faucon, L. Résultat des recherches faites dans le but de trouver l'origine des réinvasions estivales du phylloxera. (Comptes rendus, 27 Oct. 1879, v. 89, p. 693–696.)

Crit rev. by P. de Lafitte, entitled, "Sur les causes de réinvasion des vignobles phylloxérés." (Comptes rendus, 17 Nov. 1879, v. 89, p. 847–850.)

". . . One of the causes of these re-invasions is the spreading of the insect on the surface of the ground; a second cause, and perhaps the most important, is the transportation of the insect by the wind; finally, the author sees a third cause in the eggs which come from the sexual insects." — *Rev. scientifique*, 8 Nov. 1879, p. 454.

M. Faucon's paper is followed (p. 696–697) by remarks by M. Fremy and by the secretary of the Academy [Jean Baptiste Dumas].
G: D. (1825)

Faucon, L. Résultat des recherches faites dans le but de trouver l'origine des réinvasions du phylloxera. (Comptes rendus, 3 Nov. 1879, v. 89, p. 738–744.)

Notice. (Athenaeum, 29 Nov. 1879, p. 699, col. 1, 4 cm.)

Abstract. (Mo. journ. sci., Dec. 1879, s. 3, v. 1, p. 821.)
G: D. (1826)

Field, Fanny. [Lice on chickens.] (Prairie farmer, 12 June 1880, v. 51, no. 24, p. 187, col. 3, 38 cm.)

Whitewashing, fumigating with sulphur, washing with kerosene, cleanliness and "eternal vigilance," etc., recommended for the destruction of lice on chickens.
J. D. P. (1827)

Fletcher, James. Entomology for beginners. (Can. entom., Feb. 1880, v. 12, p. 32–35.)

General remarks on entomology; describes and figures *calosoma calidum* and *c. scrutator.* *G: D.* (1828)

Fletcher, James. Nature-printed butterflies. (Can. entom., Jan. 1880, v. 12, p. 1–3.) (Annual rept. entom. soc. Ontar. for 1879, 1880, p. 88–89.)

Mode of transferring the scales of butterflies' wings to paper to form a cabinet of figures of butterflies.
G: D. (1829)

Graef, E: L: *Gortyna nebris* Guén., var. *g. nitela* Guén. (Bull. Brooklyn entom. soc., May 1878 [v. 1], p. 7.)

Reasons for considering these two forms as only color varieties of one species. *F. G: S.* (1830)

Graef, E: L: Some notes on *arctia figurata* Dru. (Bull. Brooklyn entom. soc., May 1878 [v. 1], p. 3–4.)

Larvae fed on *taraxacum;* imagos obtained from them varied in color and markings of hind wings, as is usual among arctians, while forewings did not vary; suggests the specific identity of some supposed distinct species.
F. G: S. (1831)

Insect devastations in America. (Journ. applied sci., April 1879, v. 10, p. 58–59, 20 cm.)

Statistics taken from the *Scientific american.*
G: D. (1832)

Lafitte, P. de. Sur les causes, de réinvasion des vignobles phylloxérés. (Comptes rendus, 17 Nov. 1879, v. 89, p. 847–850.)

Crit. rev. of L. Faucon's "Résultat des recherches faites dans le but de trouver l'origine des réinvasions estivales du phylloxera" (Comptes rendus, 27 Oct. 1879, v. 89, p. 693–696) [Psyche, Rec., no. 1825]. *G: D.* (1833)

Langstroth, L. L. Comb-honey. A cure for consumption. (Amer. bee journ., 1879, v. 15, p. 65.)

Cases are given where a speedy cure of consumption was effected by eating linden honey. *A. J: C.* (1834)

Middlesex scientific field club, *Malden, Mass.* [Proceedings for 4 June 1879.] Amer. nat., Aug. 1879, v. 13, p. 537–538.)

Note by H: L. Moody on breeding the larva of *capnochroa fuliginosa.* *G: D.* (1835)

Osten Sacken, C: Robert. Souvenirs entomologiques; études sur l'instinct et les mœurs des insectes, par J. H. Fabre . . . (Entom Zeitung . . . zu Stettin, April–June 1880, jahrg. 41, p. 136–138.)

Rev. of Fabre's above-mentioned work [Psyche, Rec., no. 1588]. *G: D.* (1836)

Schaupp, Frank G: [Hints for collecting *elateridae* and coprophagus coleoptera.] (Bull. Brooklyn entom. soc., May 1878 [v. 1], p. 7.)
F. G: S. (1837)

Schaupp, Frank G: Larva of *dicaelus dilatatus.* (Bull. Brooklyn entom. soc., May 1878 [v. 1], p. 3, fig. 1.)

Superficial description of the larva, with poor woodcuts, and biological statements. *F. G: S.* (1838)

Schaupp, Frank G: Raising beetles in captivity. (Bull. Brooklyn entom. soc., May 1878 [v. 1], p. 2–3.)

Account of keeping *cicindela* and *carabidae* in breeding cages. *F. G: S.* (1839)

Schaupp, Frank G: Synoptic table of the genus *elaphrus* Latr. (Bull. Brooklyn entom. soc., May 1878 [v. 1], p. 6.)

Based upon G: R. Crotch's table published in G: H: Horn's "Synoptic tables . . ." (Trans. amer. entom. soc., Dec. 1876, v. 5, p. 246 [Psyche, Rec., no. 814], with insertion of two other species and addition of bibliography.
F. G: S. (1840)

ENTOMOLOGICAL ITEMS.

The appropriations by Congress, at its last session, include one of $25,000 for the U. S. Entomological Commission.

Joseph Baer & Co., of Frankfort-on-the-Main, have issued a catalog (no. 79) of the library of the late Dr. Haag-Ruthenberg, for sale by that firm.

The Dorthesia, or Australian bug, like the *Xanthium spinosum* and the phylloxera, have occupied the attention of the legislature [in Cape Colony]. It has already destroyed much timber, and has lately attacked vines and roses. . . .—*Colonies and India*, 31 July 1880, p. 13.

A bred specimen of *Arctia fuliginosa* which possessed only one antenna was exhibited at the meeting of the London Entomological Society, 2 June 1880. Sir J: Lubbock said that he had occasionally bred ants with only one antenna, and had possessed one with no antennae.

Miss Emily A. Smith, the well-known entomologist of Peoria, Illinois, has gone to Leipzig, where, if the university authorities will allow it, she will pursue a general course of zoological work in the new laboratory of Professor Leuckart. Her address, for the present, is Salzgässchen, 8, III, Leipzig, Germany.

Dr. Haberlandt, in the "Œster. Landwirth. Wochenblatt," in treating of the cultivation of red clover, urges agriculturists to act upon the discoveries of Darwin, and protect the humble-bees necessary for the fertilization of the blossoms of this plant.—*Journ. of Science*, May 1880, p. 347.

Under the auspices of the Government of Ceylon an elaborate illustrated work on the lepidoptera of that island is in active preparation, edited by Mr. F. Moore, F. Z. S. The publication is entrusted to Messrs. L. Reeve & Co., from whom the first instalment may be expected shortly.—*The Athenaeum*, 3 July 1880, p. 21.

Mr. Caleb Cooke, once a pupil of Agassiz, who has been an industrious collector in the neighborhood of his own home, Salem, Mass., and has also collected in South America, Zanzibar and Madagascar, and in the Mammoth Cave in Ky., died in Salem, 5 June 1880, aged 42 years and 4 months.

SOCIETY MEETINGS.

The regular meetings of the Cambridge Entomological Club will be held at 19 Follen St., at 7.45 p. m., on the days following:—

8 Oct. 1880.
12 Nov. „
10 Dec. „
14 Jan. 1881.
11 Feb. „
11 Mar. 1881.
8 Apr. „
13 May „
10 June „

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following:—

27 Oct. 1880.
24 Nov. „
22 Dec. „
26 Jan. 1881.
23 Feb. 1881.
23 Mar. „
27 Apr. „
25 May „

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following:—

8 Oct. 1880.
12 Nov. „
10 Dec. „
14 Jan. 1881.
11 Feb. „
11 Mar. 1881.
8 Apr. „
13 May „
10 June „

James H. Ridings, *Recorder.*

The semi-annual meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following:—

13 Dec. 1880.
13 June 1881.

James H. Ridings, *Recording Secretary.*

The regular monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following:—

7 Sept. 1880.
5 Oct. „
2 Nov. „
7 Dec. „
4 Jan. 1881.
1 Feb. „
1 Mar. „
5 Apr. „

G: H. Bowles, *Secretary.*

PRIZE ESSAYS.

Due 15 Oct. 1882.—Life-histories of *Sclerostoma syngamus* and of *Strongilus pergracilis*. See Psyche, v. 3, p. 59.

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EDITED BY

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Davenport, Iowa.

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Cambridge, Mass., U. S. A.: Published by George Dimmock.

YEARLY SUBSCRIPTIONS, $1. MONTHLY NUMEROS, 15 c.

[Entered as second class mail matter.]

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THE YELLOW FEVER FLY.

BY HERMANN AUGUST HAGEN, CAMBRIDGE, MASS.

It is not without precedent that certain facts or observations in natural history suddenly acquire a great fame, go more or less over the whole scientific world, and are forgotten with wonderful quickness, when they have been found out not to be true. Some twenty-five years ago the history of the famous yellow fever fly was everywhere told and largely analyzed. It seems that the height of its glory was in 1855; I say it seems, as I have been unable to see any account or even any mention of it in a scientific publication or a newspaper. Gentlemen, who were largely connected with such publications in former times, assure me that the matter was at that time much spoken of in periodicals, but that they cannot give any quotation of an article. Upon application to the well known physician, Dr. St. Julian B. Ravenel, in S. Carolina, I obtained the answer that although the Doctor had almost forgotten about it, yet with some effort of memory he recalled that during the epidemic at Norfolk in 1855, a fly appeared in swarms, which the people there said had never been seen before, and which they called the yellow fever fly. The Doctor had sent some of them to the late Prof. L. Agassiz for examination; but these are not now to be found in the collection of the museum. The Doctor, however, states that he has since found the same fly in Charleston, S. C., in dark, close places, even in perfectly healthy seasons, and thinks that it only becomes immeasurably multiplied in the dirt and filth of all kinds produced by pestilence. It has never been observed in Charleston during epidemics. This is the only direct information I was able to obtain. The collection bought by the Museum of Comparative Zoology from Prof. Loew, contains one specimen, collected in 1848 in New Orleans by the late Prof. Schaum, and three others, one marked as the yellow fever fly. The species has never been described. It belongs to *Sciara*, and a careful examination of the descriptions of all the species quoted in Baron Osten Sacken's new catalog of N. A. diptera, shows that none of them belong to this species. I was not able to compare the descriptions of *Sciara nigra* Wied.

The fact that the species appeared in swarms is also new. A list of swarms of diptera, given by Prof. Weyenbergh (Tijdskr. v. Entom., 1861), records 29, but none of *Sciara*.

I believe that a description of the species is very desirable, so that its former curious history, and the fact of its swarming, may not be lost.

NOTES ON A FEW BOMBYCES, HYBRIDS, &C.

BY ALFRED WAILLY, LONDON, ENGLAND.

In my report on silk-producing bombyces and other lepidoptera, reprinted from the Journal of the Society of Arts, 13 Feb. and 5 March 1880,[1] I speak of the disastrous effects of the weather on most species during the year 1879.

This year, although the splendid weather in August and in the early part of September allowed of the successful rearing of several species in the open air, the wet and cold weather lasting till about the end of July affected and retarded lepidoptera, as in 1879; for instance, the moths of *Samia promethea* had not all emerged before the end of August. With a few exceptions, none of the moths of Indian species emerged at all.

Actias luna. I bred this species this year for the first time, and most successfully, on walnut (*Juglans*). It thrived well also on a nut tree in my garden, together with larvae of *Telea polyphemus* and *Samia cecropia.* Unfortunately the sparrows destroyed all the larvae which were on that tree, when they were already at the end of their third stage. My European correspondents were all, I think, successful with the rearing of *Actias luna.* Yet I must observe that many ova obtained from well paired *A. luna* moths and ova of other species, were not fertile, a fact which I attribute to the low temperature of the month of June, affecting the moths.

Samia gloveri. Of this species I received a very large number of cocoons from a young entomologist, but I regret to say the attempt at rearing them was the most complete failure that can be recorded.—The moths emerged, from the middle of April to the middle of July, with a few exceptions, all crippled. The greater part of the cocoons did not produce moths; some were dead on arriving in London; others died later, either from the attacks of parasites or from some other cause. Not a single pairing could be obtained. I would be glad to try this species again.

Samia ceanothi. Of about forty cocoons, the first moth emerged in March, the second on 3 April; the rest continued to emerge till 18 July. Only two pairings were obtained. The larvae, reared on plum (*Prunus*) and willow (*Salix*), did not thrive, and all died, some going into their third stage. None of my correspondents, as far as I know, succeeded with this species. Evidently, plum and willow are not proper food plants for *S. ceanothi.*

The first pairing took place 27 June, the second 10 July. The ova of the first brood hatched 18 days, and those of the second, 15 days, after having been deposited.

The larvae, somewhat similar to those of *S. cecropia* in first and second stage, but of a lighter color, showed a marked difference in the third stage, and were thus: Back of body, sky blue, sides greenish yellow; tubercles golden yellow *all along the back*, and on the sides, blue; head green.

Hybrids. Although *Samia gloveri* refused to pair among themselves, I had several crossings between *S. gloveri*, *S. ceanothi*, and *S. cecropia.* The ova obtained from a long pairing of *S. ceanothi* ♀ with *S. gloveri* ♂, were the only ones that were fertile. Unfortunately the larvae, reared on willow and plum, all died, some reaching, like *S. ceanothi*, the third stage.

---

[1] PSYCHE, Rec., no. 1717.

The pairing of *S. ceanothi* ♀ with *S. gloveri* ♂, was from the evening of 20 to the evening of 21 May. The larvae hatched from 15 to 21 June; the majority having hatched 16 and 17 June.

First stage. Larger larvae, black; smaller ones, fallow; the colors becoming of a more uniform hue as the larvae increased in size. Very much like *S. cecropia* larvae. Second stage. Larvae yellow, with black tubercles; head black. Third stage. Back, bluish; sides, yellow. Tubercles on back, orange-red; tubercles on sides, blue; head, yellow.

The other crossings resulting from the keeping of various species together in large cages, when ♂ and ♀ moths of the same species were not obtained at the same time, are the following: in a hot-house, 22 May, *Telea polyphemus* ♀ and *Attacus mylitta* ♂ of the Bombay race; *T. polyphemus* ♀ and *Attacus pernyi* ♂; *Samia gloveri* ♀ and *A. pernyi* ♂: in my house at ordinary temperature, 12 and 13 June, *Samia ceanothi* ♀ and *S. cecropia* ♂; 15 June, *S. gloveri* ♀ and *S. cecropia* ♂; 18 and 19 June, *S. cecropia* ♀ and *S. ceanothi* ♂. In all the above cases, the ova were infertile.

ON AN AQUATIC SPHINX LARVA.

BY HERMANN AUGUST HAGEN, CAMBRIDGE, MASS.

The following letter from the Baron von Reizenstein, in New Orleans, La., was sent to me as a scientific communication by Dr. J. L. LeConte, of Philadelphia: —

"From larvae and pupae of a sphinx in my possession, there is every reason for believing that I have made a new acquisition to the lepidopterous fauna of Louisiana. They belong to the genus *Philampelus*, but the larvae far exceed in size those of the other known *sphingidae*, even of the true sphinx *Macrosila rustica* (*Sphinx chionanthi*). I found the larvae feeding on the floating *Nymphaea*, in the very centre of a draining canal in the outskirts of the city. When I discovered them, their whole body, with the exception of the first three segments, was submerged in the water. When they had devoured one patch of the water plants, they swam with great facility to a new one, the first instance I ever experienced of this habit in the larva of a sphinx, or in any caterpillar. As I am familiar with all the other known larvae of the genus *Philampelus*, and it is not probably that of *Ph. labruscae*, a strictly tropical species, which I do not know, so it is very likely an entirely new species.

Of the other species of *Philampelus* (peculiar only to the new continent) are until now only known and described: *Philampelus vitis* Linn., *Ph. achemon*, *Ph. satellitia*, *Ph. fasciatus*, and *Ph. lycaon* Cram. (*posticatus* Grote), all occurring here, except *achemon*, a northern species, and whose larvae are all known to me.

There remains then only *Philampelus labruscae*, which I do not believe is the sphinx in question. Of 25 larvae (now all pupae) in my possession, I preserved one in alcohol, to have an "*argumentum ad hominem*" for a further occasion, when I will prepare a correct drawing of the insect in all its stages.

PSYCHE.

CAMBRIDGE, MASS., SEPT. 1880.

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PROCEEDINGS OF SOCIETIES.

ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

[A fuller report of the meetings of the Club will be given subsequently; the following communications have not been published elsewhere.]

25 Aug. 1880.—The following letter, dated Coalburgh, W. Va., 22 Aug. 1880, from Mr. W: H: Edwards to Mr. S: H. Scudder was read: " . . . If you like, you may say to the lepidopterists of the Association, when they meet, that I have raised a brood of *Apatura flora* from egg to imago, and the species is distinct from *A. clyton.* I described *flora* as a possible variety of *clyton,* you remember. I shall give a plate to *flora.* Also that I have raised a brood of *Apatura alicia* from egg to imago, and this is distinct from *A. celtis,* with which you and Riley and some other lepidopterists had united it as a variety. I will figure the larva of *alicia* also.

"I have taken this summer a bi-formed *Lycaena neglecta,* one side ♂, the other ♀.

"I had a *Papilio ajax marcellus* come from chrysalis perfect, except that there was no trace whatever of *one hind wing.*

" I have two chrysalids of *Limenitis disippus* which have been on ice 30 days, and which should give imagos in 2 or 3 days. I hope to find these last changed in some direction by the cold.

"I have made some important observations on *L. disippus* and its supposed varieties, but am not ready to publish them yet. The species is *three brooded here*—that I have ascertained,—and it makes its perch not by means of its excrement, but *with bits of leaf chewed up in the mouth.* The object of the packet of bits of leaf is not yet certain.

"T. L. Mead has been in Newfoundland the last six weeks, and sent me specimens of *Coenonympha inornata* Edw., taken there by him;—a butterfly that I do not think has been reported as living within a thousand miles of that island.

"From Florida I have received examples of *Pieris ilaire, C. agarithe,* and a new *Pamphila,* size of *P. dion,* which I call *P. byssus;* also the sphinges *Oenosanda noctuiformis,* and *Anceryx scyzon,* not before attributed to North America.

"Hope you will have a good time, and wish I could be of the party."

Mr. A: R. Grote said that Mr. Edwards had also received *Didasys belae* and *Dahana atripennis,* two rare *zygaenidae,* from Florida.

30 Aug. 1880.—The following letter, dated Carbondale, Ill., 18 Aug. 1880, from Prof. Cyrus Thomas to Mr. S: H. Scudder, was read: " . . . My investigations, during the past and present year, in reference to the migrations of *Caloptenus spretus,* have brought to light facts which indicate that, after all, the opinion you and I formerly held in regard to their movements is not so far wrong as has been supposed. While it is probable that in some instances swarms sweep down from British America and Montana in a single season to Nebraska and Kansas, a careful study of their history in Dakota indicates that they usually move by successive waves (generations). This theory is also the only one that will conform to the meteorological conditions in 1866, 1874, and 1876. I am also of the opinion now that Minnesota may ultimately be freed from them, if the Coteau of the Prairies can be clothed with trees, and the lakes are preserved so that the water surface remains the same as it is now. I cannot give my reasons for this opinion in a letter, but have written them out rather briefly for Governor Pillsbury of Minnesota. They will also be given in our Third Report. . . ."

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [ ], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

Corrections of errors and notices of omissions are solicited.

A[aron], E[ugene] M. The papilios of New Jersey. (Science advocate, July 1880, v. 1, no. 3, p. [1], col. 2–4, 58 cm.; Oct. 1880, v. 1, no. 4, p. [1, 4], 170 cm.)

Popular account of the 5 species of *papilio* found in New Jersey; their habits, varieties and transformations. *B: P. M.* (1841)

Adolph, G. Ernst. Ueber Insectenflügel. (Nova acta d. kais. Leop.-Carol.-deutsch. Akad. d. Naturforscher, 1879, bd. 41, pars 2, no. 3, p. 215–291, pl. 27–32.)

Separate, Halle, 1880. t.-p. cover, p. 1–79 [or t.-p., p. 215–291], pl. 1–6 [or 27–32]. 33 × 25, t 19.5 × 14. pam., M. 8.

General discussion of the venation of the wings of insects. *G: D.* (1842)

Ants and their milch cattle. (Sci. amer., 22 May 1880, v. 42, p. 327–328, 64 cm., 1 fig.)

Popular account of how species of *formica* keep aphides for their sweet secretion. *G: D.* (1843)

Apple tree borers. (Cultivator and country gent., 10 June 1880, v. 45, no. 1428, p. 376, col. 2, 5.5 cm.)

Methods of destroying borers in apple trees; by painting the stems with coal tar; by an application of soft soap or soft soap and tobacco; by use of a knife and barbed wire. *J. D. P.* (1844)

Army worm (The). (Rural new yorker, 12 June 1880, v. 39, p. 380, col. 2–3, 39 cm., 3 fig.)

Leucania unipuncta appears on Long Island, N. Y., in vast numbers, and is very destructive to crops. *J. D. P.* (1845)

Army worm (The). No decrease in its devastation on Long Island. Farmers in despair compelled to cut down their green crops to save them from the insect. New Jersey invaded. (N. Y. herald, 11 June 1880, . . . , 138 cm.)

Reporter's description of the progress of *leucania unipuncta* in New Jersey, and of the remedies tried. *G: D.* (1846)

Army worm (The). The department of agriculture investigates the insect's habits. A voracious pest. Methods of destroying it and limiting the area of its ravages. (N. Y. herald, 14 June 1880, . . . , 72 cm.)

Letter of J: H: Comstock, containing brief account of *heliophila* (*leucania*) *unipuncta* and mode of destroying its larvae; letters from agriculturists. *G: D.* (1847)

Army worm in Essex County (The). (Boston d. advert., 28 June 1880, no. 22414, v. 135, no. 155, p. 4, col. 1^5, 7 cm.)

Ravages and movements of larvae of *leucania unipuncta* in Essex Co., Mass.; futile attempts to destroy the pests. *B: P. M.* (1848)

B., C. Exterminating lice — 2. (Cultivator and country gent., 10 June 1880, v. 45, no. 1428, p. 375, col. 2–3, 23 cm.)

Cleanliness and air-slacked lime the best means of exterminating chicken lice. *J. D. P.* (1849)

B., S. [Bees eating animal matter.] (Journ. sci., May 1880, s. 3, v. 2, p. 341.)

Wasps and bees seen sipping blood from a fresh steak, probably only for moisture. *G: D.* (1850)

Bailey, W. W. Humble bees and the *gerardia flava*. (Amer. nat., Oct. 1879, v. 13, p. 649.)

Bombus perforates the corolla of *gerardia*. *G: D.* (1851)

Ballou, W: Hosea. The literature of *Dr.* A. S. Packard, *jr.* (Chicago [Ill.] field, 31 Jan. 1880, v. 12, p. 396–398, 266 cm.)

Enumerates 158 titles of papers wholly or in part by Alpheus Spring Packard, *jr.*, many of which are entomological; and some of the titles are accompanied by quotations and reviews. *G: D.* (1852)

Bethune, C: James Stewart. Entomology for beginners. The tomato worm, *sphinx quinquemaculata*, Haworth. (Can. entom., June 1880, v. 12, p. 101–104, fig.)

Describes and figures various stages of *s. quinquemaculata*. *G: D.* (1853)

Billings, Elkanah. [Obituary notice, by J. F. Whiteaves, entitled] "Obituary notice of Elkanah Billings, F. G. S." (Can. nat., 1877, v. 8, p. 251–261.)

Mr. Billings was b. 5 May 1820, and d. 14 June 1876. [PSYCHE, Rec., no. 893.] *B: P. M.* (1854)

Brauer, Friedrich. Eine unbewusste Entdeckung Fritz Müller's. (Zool. Anzeiger, 22 March 1880, jahrg. 3, p. 134–135.)

F. Müller has first discovered the early stages of one of the *blepharoceridae*, which he names *curupira torrentium*. *Curupira*, Müller, is a synonym of genus *paltostoma*, Schiner, from Bogota. Relationship of the *blepharoceridae* as based upon their metamorphoses. *G: D.* (1855)

Brown, Warren. Vermin on stock. (Western stock journ. and farmer, June 1880, v. 10, no. 6, p. 127, cols. 1–2, 43 cm.)

Various remedies for lice on animals tried; recommends the use of carbolic soap, and gives directions for making it. *J. D. P.* (1856)

Bugs in peas not chinch bugs. (Prairie farmer, 12 June 1880, v. 51, no. 24, p. 188, col. 5, 5 cm.)

Bugs infesting peas at Henry, Dak., are not chinch bugs. *J. D. P.* (1857)

Bugs, To protect vines from. [By "Farmer's wife."] (Cultivator and country gent., 10 June 1880, v. 45, no. 1428, p. 375, col. 2, 5 cm.)

Insects may be kept away from vines by covering the vines with netting; solution of hen-manure not agreeable to bugs. *J. D. P.* (1858)

Burgess, E: The structure and action of a butterfly's trunk. (Amer. nat., May 1880, v. 14, p. 313–319, fig. 1–6.)

Minute structure of the proboscis of *danais archippus;* butterflies roll their proboscis by action of its diagonal muscles; fluids are pumped into the stomach by an oral sack. *G: D.* (1859)

C., J. F. Worms in peach trees. (Rural new yorker, 29 May 1880, v. 39, no. 22, p. 346, col. 3, 3 cm.)

Method of destroying worms (species not stated) at the roots of peach trees, with boiling water. *J. D. P.* (1860)

Cabbage worms. (Prairie farmer, 12 June 1880, v. 51, no. 24, p. 186, cols. 3–4, 45 cm.)

A species of *agrotis* destructive to cabbage; habits and remedies; compared with *pieris rapae.* *J. D. P.* (1861)

Carlet, G. Sur la locomotion des insectes et des arachnides. (Comptes rendus, 29 Dec. 1879, p. 1124–1125.)

Eng. tr., entitled, "On the locomotion of insects and arachnida." (Ann. and mag. nat. hist., Feb. 1880, s. 5, v. 5, p. 196.)

"Extract. (Naturforscher, 1880, no. 8, p. 75.)"

G: D. (1862)

Carlet, G. On the locomotion of insects and arachnida. (Ann. and mag. nat. hist., Feb. 1880, s. 5, v. 5, p. 196.)

Eng. tr. of G. Carlet's "Sur la locomotion des insectes et des arachnides" (Comptes rendus, 29 Dec. 1879, p. 1124–1125) [PSYCHE, Rec., no. 1862]. *G: D.* (1863)

Carpenter, W. L. Experiments with *pyrethrum roseum* in killing insects. (Amer. nat., March 1879, v. 13, p. 176–177.)

Timed experiments upon a number of insects placed with powdered *pyrethrum* "under a tumbler, which was slightly raised to admit fresh air." . . . "In experimenting upon the *coleoptera*, an insect as nearly the size of the carpet-beetle as could be found was secured in *Diabrotica duodecim-punctata*, an abundant species here. It was easily affected and became helpless in twelve minutes." . . . "These experiments prove that all insects having open mouth parts are peculiarly susceptible to this powerful drug. And as a result, the writer does not hesitate to recommend the powder to housekeepers as an infallible agent in destroying the carpet-beetle and preventing its ravages." *G: D.* (1864)

Connoisseurs will recognise the absurdity of the argument. B: P. M.

[**Cermatia forceps** in Rhode Island.] (Science advocate, Jan. 1880, v. 1, no. 1, p. [4], col. 2, 4 cm.)

Abstract of A. S. Packard, *jr.'s* "A poisonous centipede" (Amer. nat., Aug. 1879, v. 13, p. 527) [PSYCHE, Rec., no. 1780]. *G: D.* (1865)

Chambers, Vactor Tousey. Descriptions of new *tineina* from Texas, and others from more northern localities. (Bull. U. S. geol. and geog. surv. terr., 1878, v. 4, no. 1, p. 79–106.)

Describes the following 1 n. g. and 46 n. sp.: *anaphora texanella, tinea? septem-strigella, anesychia hagenella, hyponomeuta zelleriella, depressaria eupatoriiella, d. fernaldella, cryptolechia? obscuromaculella,* 13 sp. of *gelechia, dasycera nonstrigella,* 7 sp. of *coleophora, cosmopteryx quadrilineella, eriphia? albalineella, e? nigrilineella, elachista texanella, e. staintonella, tischeria latipenella, t. pulvella,* 5 sp. of *lithocolletis, acanthocnemes* (n. g., type: *a. fuscoscapulella*), *a. fuscoscapulella, phyllocnistis erechtitisella,* 4 sp. of *nepticula;* notes on other species of the same genera and of *ypsolophus, cleodora, anarsia,* and *butalis,* especially synonymical notes on certain species described as *depressaria; hagno=psilocorsis=cryptolechia* pars. *B: P. M.* (1866)

Chambers, Vactor Tousey. Index to the described *tineina* of the United States and Canada. (Bull. U. S. geol. and geog. surv. terr., 1878, v. 4, no. 1, p. 125–167.)

Reference to European literature as late as 1875 and N. American as late as 1877 or later, upon these insects as American species. Enumerates about 780 accepted species, belonging to about 108 accepted genera, with synonyms. *B: P. M.* (1867)

Chambers, Vactor Tousey. *Tineina* and their food-plants. (Bull. U. S. geol. and geog. surv. terr., 1878, v. 4, no. 1, p. 107–123.)

"A catalogue of plants which are fed upon by the *tineina* within the limits of the United States and Canada so far as they are at present known. Mentions about 90 species or groups of species of plants (all phaenogamous); about 30 species of larvae, the imagos of which are unknown; about 200 species, of which the imagos also are known; and about 5 species known only by their mines. *B: P. M.* (1868)

Charbonneaux, Émile. Chasses aux coléoptères dans les villes. (Feuille des jeunes naturalistes, April 1870, an. 10, p. 82.)

Localities for searching insects in town. *G: D.* (1869)

Chatin, Joannes. Origine et valeur morphologique des différentes pièces du labium chez les orthoptères. (Comptes rend., 13 Oct. 1879, v. 89, p. 652–653.)

G: D. (1870)

[**Cholodkowsky,** N.] Ueber den Bau der Testikel bei Schmetterlingen. (Zool. Anzeiger, 3 May 1880, jahrg. 3, p. 214–215.)

Abstract of a paper by N. Cholodkowsky before the zoological section of the sixth assembly of Russian naturalists and physicians. *G: D.* (1871)

Cholodkowsky, N. Ueber die Hoden der Schmetterlinge. (Zool. Anzeiger, 8 March 1880, jahrg. 3, p. 115–117.)

Records the important points gained in the study of the testes of 34 species of diurnal lepidoptera. *G: D.* (1872)

Cochineal insect (The). (New remedies, June 1880, v. 9, p. 175, 18 cm.)

Partial reprint of H. B. M.'s "Curious facts concerning the cochineal insect . . ." (Sci. amer., 22 Nov. 1879, v. 4, p. 325, col. 1) [PSYCHE, Rec., no. 1536]. *G: D.* (1873)

Coleman, Nathan. Habits of the cut worm [larva of *agrotis*]. (Amer. nat., June 1873, v. 7, p. 372.) *G: D.* (1874)

Comstock, J: H: Report upon cotton insects, prepared under the direction of the commissioner of agriculture in pursuance of an act of Congress approved June 19, 1878. Washington, 1879. 5 + 511 p., 3 pl., 24 × 15, t 19 × 11.1, 76 il.

Notice. (Rural new yorker, 5 June 1880, v. 39, no. 23, p. 270, col. 4, 7.5 cm.)

Title, table of contents and letter to the commissioner (p. 1–5, 1–9); full and general account of *aletia argillacea* (p. 11–284, pl. 1, fig. 1–75); general account of *heliothis armigera* (p. 285–315, pl. 2; fig. 76–77); nectar and its uses (p. 317–343, pl. 3); appendices (p. 345–494); index (p. 495–511). Contains chapters upon the classification and nomenclature, the past history, the habits and natural history and the natural enemies of *aletia argillacea*, measures preventive of its ravages, statistics of losses, the theory of migrations of the moth, the influence of weather upon it, and a bibliography of nearly 100 citations on these subjects; also chapters upon the importance of *heliothis armigera*, its nomenclature and natural history, the influence of weather upon it, and remedies for its ravages; also (by W: Trelease) a discussion of the nature and uses of nectar, and a bibliography of nearly 200 citations on the subject; also reports of special agents and local observers (E. A. Schwarz, A: R. Grote, E. H. Anderson, W: J. Jones, J. E. Willet, W: Trelease, E. A. Smith), answers to circular, and list of correspondents. *B: P. M.* (1875)

Comstock, J: H:, *see* ARMY worm (The) [PSYCHE, Rec., no. 1847].

Coquillett, Daniel W: On describing larvae. (Can. entom., June 1880, v. 12, p. 108.)

A few terms recommended for use in describing larvae of lepidoptera. *G: D.* (1876)

Coquillett, Daniel W: On the early stages of some moths. (Can. entom., March 1880, v. 12, p. 43–46.)

Describes larvae of *hypena scabra*, *calpe canadensis*, *pseudoglossa lubricalis*, *scepsis fulvicollis*, *chytolita morbidalis*, *hypoprepia fucosa*, *parorgyia clintonii*, *botis penitalis* and *arsilonche henrici*. *G: D.* (1877)

Couper, W: *Alypia maccullochii*, Kirby. (Can. entom., March 1880, v. 12, p. 41–42, fig. 7–8.)

Figures and describes male of this moth. *G: D.* (1878)

Curculio [*conotrachelus nenuphar*]. (Prairie farmer, 12 June 1880, v. 51, no. 24, p. 186, col. 4, 12 cm.)

Habits of curculio diurnal; methods of destroying them, by jarring, and by Ransom's traps. *J. D. P.* (1879)

Destruction of insects by fungi. (Amer. nat., July 1880, v. 14, p. 516–517.)

Notice of Elias Metschnikoff's suggestion to employ *isaria destructor* for killing insects. [*See* METSCHNIKOFF, E., Zur Lehre über Insectenkrankheiten (PSYCHE, Rec., no. 1634).] *G: D.* (1880)

Dragon fly (The). (Science advocate, Oct. 1880, v. 1, no. 4, p. [4], col. 3–4, 37 cm.)

From the *Worcester* [*Mass.*] *spy*. Popular general account of the *odonata*. *B: P. M.* (1881)

Fabre, J. H. Mœurs et parthénogénèse des halictes [PSYCHE, Rec., no. 1629].

Eng. tr., entitled, "On the habits and parthenogenesis of the *halicti*." (Ann. and mag. nat. hist., Feb. 1880, s. 5, v. 5, p. 194–196.) *G: D.* (1882)

Fabre, J. H. On the habits and parthenogenesis of the *halicti*. (Ann. and mag. nat. hist., Feb. 1880, s. 5, v. 5, p. 194–196.)

Eng. tr. of J. H. Fabre's "Mœurs et parthénogénèse des halictes" (Comptes rendus, 22 Dec. 1879, p. 1079–1081) [PSYCHE, Rec., no. 1629]. *G: D.* (1883)

Fatio, V. Désinfection des véhicules par l'acide sulfureux anhydre. (Comptes rendus, 12 April 1880, v. 90, p. 851–854.)

Experiments in railway carriages to determine the destructive effect of sulphurous anhydride [SO^2] upon plants and upon phylloxera. *G: D.* (1884)

Fletcher, James. Notes and queries. (Can. entom., March 1880, v. 12, p. 60.)

Answer, by A. H. Mundt, entitled, "[Cossus]." (Can. entom., May 1880, v. 12, p. 100.)

Inquiries about how to rear wood-boring insects. *G: D.* (1885)

F[oster], S[uel]. Crop and market reports, Muscatine, Iowa, May 25 [1880]. (Cultivator and country gent., 3 June 1880, v. 45, no. 1427, p. 357, col. 4, 5.5 cm.)

Canker worms [*anisopteryx*] mostly destroyed with Paris green, arsenic, and London purple,—the latter much the cheapest and best. *J. D. P.* (1886)

French, G: Hazen. Notes on the larva of *agrotis lubricans*. (Can. entom., Jan. 1880, v. 12, p. 14.)

Describes larva. *G: D.* (1887)

French, G: Hazen. Notes on the larva of *heterocampa pulverea*, G. & R. (Can. entom., May 1880, v. 12, p. 83–84.)

Describes larva which feeds on *quercus alba* and *q. coccinea*. *G: D.* (1888)

French, G: Hazen. Two new species of *ichneumonidae*. (Can. entom., March 1880, v. 12, p. 42–43.)

Describes 2 new species, *microgaster utilis* (reared from larva of *sphinx carolina* and from larva of a species of *leucania*) and *macrocentrus iridescens* (reared from a larva supposed to be that of *eugonia subsignaria*). *G: D.* (1889)

French government and the phylloxera (The). (Times [Lond., Eng.], 17 April 1880, no. 29858, p. 13, col. 2, 5 cm.)

Statistics of expenditures in attempting to suppress the phylloxera. *G: D.* (1890)

Frost as a vermin-destroyer. [By "An old naturalist."] (Journ. of sci., June 1880, s. 3, v. 2, p. 407.)

The severe cold of the winter of 1878–79 did not prevent the ravages of *abraxas grossulariata* and *plusia gamma* the next summer. *G: D.* (1891)

Fügner, K. Der Duftapparat von *sp. ligustri.* (Entom. Nachrichten, 1 Aug. 1880, jahrg. 6, p. 166.)

Experiments on the apparatus by which *sphinx ligustri* produces an odorous exhalation. *G: D.* (1892)

Fuller, Andrew S. Nuts and nut-bearing trees. (Frank Leslie's popular mo., May 1880, v. 9, p. 551–555, 148 cm., 12 fig.)

Popular description and figures of the larva and imago of the regal walnut-moth, *ceratocampa regalis*, and of the larva, pupa and imago of the hazel-nut weevil [*balaninus?*]. *G: D.* (1893)

Gerard, W. R. The *saprolegnia ferax.* (Proc. Poughkeepsie [N. Y.] soc. nat. sci., Oct. 1878–July 1879, p. 25–28, 89 cm.)

Sporendonema muscae, a fungus parasitic on flies, is the terrestrial state of an amphibious fungus, which, in its aquatic condition, is *saprolegnia ferax*, a fish-parasite; description of both forms. *G: D.* (1894)

Gibbes, Lewis R. Flight of butterflies. (Can. entom., March 1880, v. 12, p. 60.)

Flight of *callidryas* across the harbor of Charleston, S. C., in 1870. *G: D.* (1895)

Gillman, H: The Colorado potato beetle varying its food. (Amer. nat., July 1873, v. 7, p. 430–431.)

Doryphora decemlineata eats other plants than *solanum*, or even *solanaceae*. *G: D.* (1896)

Gissler, Carl Friedrich. The anatomy of *amblychila cylindriformis* Say. (Psyche, May–June 1879, v. 2, p. 233–244, pl. 1.)

Rev., entitled, "The microscope in entomology." (Amer. nat., Sept. 1879, v. 13, p. 595–596.)

G: D. (1897)

Grote, A: Radcliffe. On the neuration of *eustrotia secta.* (Can. entom., March 1880, v. 12, p. 50.)

Describes wing-neuration. *G: D.* (1898)

Grote, A: Radcliffe. New *noctuidae.* (Can. entom., May 1880, v. 12, p. 88–89.)

Describes 2 new species, *xylomiges dolosa* [? from Me.], and *mamestra defessa* from California. *G: D.* (1899)

Grote, A: Radcliffe. Preliminary list of North American species of *crambus.* (Can. entom., April 1880, v. 12, p. 77–80.)

Enumerates 42 species, two of which, *c. duplicatus* (from N. Y.) and *c. repandus* (from Col.), are new species, with description. *G: D.* (1900)

[**Hind,** G: C.] Collecting and mounting spiders' webs. (Amer. nat., June 1880, v. 14, p. 464–465.)

Abstract of a paper by G: C. Hind, before the Queckett Microscopical Club. The beaded condition of a spider's web is caused by relaxation of the tension of the thread just after it is emitted by the spider. *G: D.* (1901)

March of the army worm. (Boston d. advert., 22 June 1880, no. 22409, v. 135, no. 150, p. 1, col. 5, 36 cm.)

Invasion of Connecticut and southeastern Massachusetts by larvae of *leucania unipuncta*; rapidity of their march, havoc in pastures and grain fields. *B: P. M.* (1902)

Microscope in entomology (The). (Amer. nat., Sept. 1879, v. 13, p. 595–596.)

Rev. of C. F. Gissler's "The anatomy of *amblychila cylindriformis* Say" (PSYCHE, May-June 1879, v. 2, p. 233–244, pl. 1) [PSYCHE, Rec., no. 1897.] *G: D.* (1903)

Miller, A. Ant battles. (Amer. nat., March 1880, v. 14, p. 209.)

G: D. (1904)

Mivart, St. G: The relations of living beings to one another. (Contemporary rev., y. 15, April 1880, p. 606–625.)

Discusses relations of insects to plants and to other living beings. *G: D.* (1905)

Mundt, A. H. [Cossus.] (Can. entom., Feb., 1880, v. 12, p. 39.)

Supplement. (Can. entom., May 1880, v. 12, p. 100.)

Records finding larvae of *cossus* in oak [*quercus*] and in cottonwood [*populus*]; notes upon the larvae. *G: D.* (1906)

Mundt, A. H. [Cossus.] (Can. entom., May 1880, v. 12, p. 100.)

Supplement to a letter by the author (Can. entom., Feb. 1880, v. 12, p. 39) [PSYCHE, Rec., no. 1906], and in answer to James Fletcher's "Notes and queries" (Can. entom., March 1880, v. 12, p. 60) [PSYCHE, Rec., no. 1885]. *G: D.* (1907)

Novi, G. Sur l'emploi des sables volcaniques dans le traitement des vignes attaquées par le phylloxera. (Comptes rendus, 31 May 1880, v. 90, p. 1258–1259.)

Employs volcanic sand against phylloxera. *G: D.* (1908)

[**Odorous** exhalation in butterflies.] Ueber den Duft bei Schmetterlingen. (Entom. Nachrichten, 1 Aug. 1880, jahrg. 6, p. 166–167.)

Translation of a note by Ernest Lelièvre (Le naturaliste, 1 June 1880). Both sexes of *thais polyxena* Schiff. (*t. hypsipile* Fabr.) emit an odorous exhalation. Notes an exhalation in *spilosoma fuliginosa.* *G: D.* (1909)

Packard, Alpheus Spring, *jr.*, *see* BALLOU, W: H., The literature of *Dr.* A. S. Packard, *jr.* [PSYCHE, Rec., no. 1852].

Reichenau, W. Der Duftapparat von *sphinx ligustri.* (Entom. Nachrichten, 1 July 1880, jahrg. 6, p. 141.)

The apparatus by which *s. ligustri* emits an odorous exhalation discovered on the first abdominal segment. *G: D.* (1910)

Trichopetalum [**lunatum** found in Philadelphia, Pa]. (Amer. nat., May 1880, v. 14, p. 376.)

G: D. (1911)

White wax of Sze-chuen (The). (New remedies, March 1880, v. 9, p. 81, 20 cm.)

Mode of obtaining wax from a species of insect [? *coccus*], which feeds on *ligustrum lucidum* in China. Facts from *Pall mall gazette.* *G: D.* (1912)

Whiting, L. C. Foul brood. (Amer. bee journ., 1879, v. 15, p. 504.)

A. J: C. (1913)

ENTOMOLOGICAL ITEMS.

A PHYLLOXERA congress met at Saragossa, Spain, 2 Oct. 1880.

OWING TO the ravages of the phylloxera in France, the people are using raisins for making wine. During the first six months of 1880, 48,000,000 kilograms of raisins were imported into France.

DR. E. ERLENMEYER gives, in the "Bienen Zeitung," details of experiments showing that bees elaborate their wax from non-azotised matter. Carbo-hydrates serve also for the production of the fat found in the body of the bee. The food of these insects should not be very rich in nitrogenous matter. — *Journ. of Science* May 1880, p. 347.

THE BOOKS of the large library of the late Dr. C. Stål, of Stockholm, Sweden, are for sale by R. Friedländer u. Sohn, Carlstr., 11, Berlin. Catalogs, in three parts, will be sent for 50 pfennige (12c) in stamps each part. Contents: Part I, Scripta miscellanea, coleoptera, 40 p.; II, Lepidoptera, 22 p.; III, Hymenoptera, neuroptera, orthoptera, diptera, hemiptera, parasita, 30 p.

PROF. CYRUS THOMAS proposed to the Entomological Club of the A. A. A. S., for discussion, this year, the following questions, with a view to finding means of diminishing the ravages of *Caloptenus spretus* in the Territories of the United States: —

"Is it possible to increase the amount of moisture on the great plains east of the Rocky Mountains? Or to state it differently, Is it possible to supply any considerable portion of these plains with water sufficient for agricultural purposes? This leaves the question as broad and general as possible. This is an important practical question, which must sooner or later come up for solution. I think it would be well to agitate it, that the general government and western States may be induced to take it up. There are some reasons for believing that there are some possible methods of attaining the desired end which have not yet been presented or discussed. I suggest it, not that I feel competent to take hold of it, but from the fact that my work brings me constantly face to face with it, and that I do not feel qualified to enter upon an attempt at its solution."

SOCIETY MEETINGS.

THE REGULAR meetings of the Cambridge Entomological Club will be held at 19 Follen St., at 7.45 p. m., on the days following: —

8 Oct. 1880.
12 Nov. „
10 Dec. „
14 Jan. 1881.
11 Feb. „
11 Mar. 1881.
8 Apr. „
13 May „
10 June „

B: PICKMAN MANN, *Secretary.*

THE REGULAR meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following: —

27 Oct. 1880.
24 Nov. „
22 Dec. „
26 Jan. 1881.
23 Feb. 1881.
23 Mar. „
27 Apr. „
25 May „

B: PICKMAN MANN, *Secretary.*

THE REGULAR meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following: —

8 Oct. 1880.
12 Nov. „
10 Dec. „
14 Jan. 1881.
11 Feb. „
11 Mar. 1881.
8 Apr. „
13 May „
10 June „

JAMES H. RIDINGS, *Recorder.*

THE SEMI-ANNUAL meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following: —

13 Dec. 1880.
13 June 1881.

JAMES H. RIDINGS, *Recording Secretary.*

THE REGULAR monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following: —

7 Sept. 1880.
5 Oct. „
2 Nov. „
7 Dec. „
4 Jan. 1881.
1 Feb. „
1 Mar. „
5 Apr. „

G: H. BOWLES, *Secretary.*

PRIZE ESSAYS.

DUE 15 OCT. 1882. — Life-histories of *Sclerostoma syngamus* and of *Strongilus pergracilis*. See PSYCHE, v. 3, p. 59.

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VI. Jahrg. 1880.

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J. Henry Comstock,
Department of Agriculture,
Washington, D. C.

No. 76 was issued 4 Nov. 1880.

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[Established in 1874.]

EDITED BY

George Dimmock, *Cambridge, Mass.;* B: Pickman Mann, *Cambridge, Mass.;*
Albert J: Cook, *Lansing, Mich.;* Clifford Chase Eaton,
Cambridge, Mass.; Joseph Duncan Putnam,
Davenport, Iowa.

Vol. 3. No. 78.

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Cambridge, Mass., U. S. A.: Published by George Dimmock.

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PSYCHE.

DESCRIPTION OF THE PREPARATORY STAGES OF *APATURA ALICIA.*

BY WILLIAM HENRY EDWARDS, COALBURGH, W. VA.

EGG. — Nearly spherical, flattened at base; marked by 20 vertical ribs, between which are many fine, horizontal striae; color pale yellow-green. Duration of this stage 3 to 4 days.

YOUNG LARVA. — Length 2 mm; cylindrical, tapering slightly from segment 2 to 13: color pale green; covered with minute concolored tubercles, each of which sends out a white hair. As the stage proceeds, the color changes to deep green, and at the extreme edge of dorsal area appears a whitish line, and another along base over feet; under side, feet and legs green; head broader than body, sub-globular, a little depressed at top; color dark brown. Duration of this stage 3 to 4 days.

After 1st moult. — Length 3.6 mm.; tapering from segment 2, and ending in two short, conical, divergent tails; color uniform dark green, and sprinkled uniformly over back and sides with fine yellow tubercles, distinctly separated, each giving out a short hair; two sub-dorsal lines, composed of same fine tubercles, but close set, pass from head to the ends of the tails; on middle of side is a wavy line of similar tubercles, and below the spiracles is another line, straight; the ends of the tails rather roughly tuberculated, with longer hairs, pointing backward; head twice as broad as segment 2; subquadrate, the base nearly square, the sides rounded, the top depressed in front at the suture; on each vertex a stout process or horn, divergent, tapering, 0.5 mm. long, ending in two equal, divergent forks, the length of these being about two-fifths the length of the whole horn; the forks are even sized till near the top, then bluntly conical; behind the horn is a short spine just below the fork, and five small ones around it half way down; along top of head two prongs between the horns, and another back of each. On the side of face, back, are two prongs, each bent down, the upper a little below base of horn measuring 0.38 mm., the other about half as long; whole surface densely and shallowly pitted, and covered with a fine whitish down; all the horns and spines beset with long white hairs, which, from the tips, form pencils; color of front face whitish-green, the top for a narrow space, brown, and a little brown below horns, on the side; the back of head green; the horns brown in front, green behind; the space along back head and on side green; ocelli black. Duration of this stage about 5 days.

After 2d moult. — Length 7.6 mm.; shape as before; color uniform dark green; all the lines as before; head as before; the horns 1 mm. long to end of forks, the forks being about one-third of this; below each horn on side of face a very short cone; down side of face are now fine spurs, the upper one longest, the rest gradually diminishing to a very short one quite at base; other spurs as before; the color of head varies in individuals, the upper front face and the front of horns being always dark brown, the rest of face greenish-white. In some examples the brown extends half way down, fading into vinous at its lower edge; in one a pale brown stripe extended from base of horn at side to the outer end of mandibles; the back of head always green; the spurs green, the longer ones usually brown at tips. Duration of this stage 3 days.

After 3d moult. — Length 14 mm.; body white in the middle; color more yellow, of one shade; the tubercles and all lines as before. In one example, as this stage proceeded, a minute yellow spot appeared on the anterior edge of each segment from 6 to 11, on dorsal line, but in the others these spots did not appear till the subsequent moult. Head shaped as before, with the processes and spurs as at preceding stage; colors variable. Most have the upper part and front horns vinous-brown, with a slight brown stripe from below horns to end of mandibles, and a shorter one down side to top of the ocelli. One had the green restricted to a little space in front, and a little stripe on side between the two brown stripes before spoken of; another had all the face green, the horns alone being brown; another has a narrow rim of brown along the top, and two side stripes. In all the front of horns is brown, green behind, and the green spurs or prongs behind have brown tips. To next moult 4 days.

After 4th moult. — Length 21 mm. In from 4 to 11 days after the moult the larvae pupated.

Mature Larva. — Length ♂ 29 mm., ♀ 36 mm; greatest breadth ♂ 6.1 mm., of ♀ 7.6 mm,; stout, thickest in middle, the dorsum greatly arched, tapering pretty evenly either way, so that segments 2 and 12 are of about same diameter; ending in two small, conical, divergent tails, 1.8 mm. long, one placed on each side of the segment, the space between their bases being the convex surface of the segment. Color of whole surface, dorsum and sides, from segment 2 to ends of tails, one shade of yellow-green; next over feet a little bluish, the under side pale; thickly sprinkled with little yellow tubercles, which are distributed equally over whole surface, and are distinctly separated. These are mostly of two sizes, one twice that of the other; some are pointed at top, some rounded, and each gives out a short white hair. There are neither stripes nor bands, but a fine line of tubercles like those elsewhere, but close set, runs from head to end of tail, at each edge of the dorsal area. A similar line below spiracles from segment

3 to 13; and on middle of side from segment 7 to 10. Sometimes from segment 6 to 11 is a short oblique line, made up of same tubercles, pointing forward and downward; on the medio-dorsal line on segments 6 to 11, on the anterior side of each segment, is a little rounded yellow spot, smallest on 6 and 11, and often indistinct, on 7 to 10 clear colored. The largest spot observed measured but 0.08 mm. in diameter. Immediately after the fourth moult all these spots were indistinct, but they became conspicuous as the stage progressed. Feet and legs bluish-green; head sub-quadrate, about as broad as segment 3, as broad as high, the sides and also the base a little convex, the top deeply depressed in front at the suture; the vertices conical and each bearing a branching process or horn. These all stout at base, tapering, 2 mm. long, forked near top, the forks being 0.5 mm. long; about the middle part are set five short conical spurs; at base behind are two spurs on inner side and one on outer side; down the side of face three in vertical line, the upper one long, the others gradually diminishing, all bent downward; between the last of these and the ocelli, a short spur; many minute spurs are found down back and sides to mandibles; whole surface of head and horns thickly and shallowly pitted, and covered with a fine whitish down; the spurs and horns beset with quite long hairs on their sides and tops; the color of face is variable; some have it blue-green, vitreous, along the top vinous-brown; a whitish vertical stripe from inner base of each horn down the suture, and another beginning a little below horn on the side, and running to end of mandibles; one example had nearly all vinous-brown, there being merely a little green over mandibles; in this one even the back of horns and head was brown; in all others these parts were green, the fronts of the horns brown; some had the upper part of face vinous, with the fine stripes paler brown; one had the whole face green, no brown, with fine paler stripes.

Chrysalis. — Length 23 to 25 mm.; breadth of the largest at wing cases 8.1 mm.,of abdomen 6.6 mm.; depth of abdomen 9.1 mm.; compressed laterally; the outline of ventral side convex; the abdomen prominent dorsally, much arched, sharply carinated, the carina finely and irregularly serrate and on it the anterior edge of each segment is produced and is marked on each side by a shining black dot; the last segment ending in a long bifurcated pad of hooklets; the thoracic segments roundly excavated below mesonotum, and the sides there also excavated in the direction of the bases of the wings; mesonotum angular, a little rounded at summit, with a low and narrow keel; head case produced, sub-conic, the projections at vertices prominent, sub-pyramidal, bent in at the top; color delicate yellow-green, thickly covered with pale yellow dots and patches over the abdomen, and beyond, on dorsal side to top of head, with irregular pale yellow inscriptions; many of these marks also on the wing cases transversely between the nervures; the neuration of the wings distinct; a yellow line passes along the keel from the last segment to top of head case, and a little beyond top of mesonotum sends two forks to the projections of head; another line, but white, passes along the posterior edge of the wing case until it strikes a white line from last segment along middle of side of abdomen; on each side of mesonotum a white dot and one on each side of most of the abdominal segments; the junctions of these segments indicated by a white line. Duration of the stage 9 days.

I described *Apatura alicia*, with plate, in the Butterflies of N. A., 1868, v. 1, p. 135. In 1874, Mr. Riley, in his 6th Mo. Rep., argued at length against the probability of its being a good species, or more than a variety of *A. celtis*. But he closes by saying very fairly, "But all such questions must be left to the future to decide; meanwhile Mr. Edwards' opinion is, in one sense, as rightly held as Mr. Scudder's or mine."

Mr. Scudder, in his Synonymical list, 1875, put *A.alicia* as a synonym of *A. celtis*, not even crediting it as a possible variety.

The only way, therefore, to settle the point, was to breed this form from the egg, and for several years I have made every effort to do so, and at last have succeeded. I received from a correspondent in south-eastern Florida several examples of the butterfly early in the season of 1880, and I urged him to attempt getting eggs by enclosing a female in a bag over a limb of any species of Celtis tree found there. This was done, and seven eggs were forwarded to me by mail. I received two larvae from these eggs, hatched on the road, on 15 June. The eggs were laid on *Celtis integrifolia* Chapman, but the larvae fed readily on *C. occidentalis* here. One escaped after its second moult, but the other went on to chrysalis.

On 17 August, I received several more larvae from eggs obtained in the same manner. They were near the first moult when they came, and began to pass it on 19 August. Of these I raised five to imago; some died. And examples at every stage were put in alcohol.

The larva after first moult is distinct from that of *A. celtis*. It is uniform dark green, sprinkled with separate yellow tubercles, which are equally distributed over whole upper surface — dorsum and sides; on each side of dorsal area is a fine line of same tubercles close set, from head to the end of the tail; on middle of side a wavy line, and below spiracles a straight one; the face is pale green, along the top brown, the back dark green; the horns are brown in front, green behind; the single spurs along back of head are all green; the horns are all larger, more tapering, and branches shorter than in *A. celtis*.

A. celtis after first moult has the dorsum occupied by a band composed of yellow tubercles, a space in middle of this band on posterior half of each segment from 2 to 13, being green; the sides are green, and the line on side is crenated, not wavy; along base a straight line as in *alicia;* the face is either black or purple or green; the horns are green; the ends of the spurs usually purple or black.

Each species preserves these characteristics through the next stages. After the fourth moult (the last stage), *alicia*, as already described, is always of one shade of color over back and sides — yellow-green; covered uniformly with small, separated tubercles; there are two sub-dorsal lines as before described, and the wavy line on side has given place to an oblique mark on segments 6 to 11; there is no medio-dorsal line or stripe, but on the anterior edges of segments 6 to 11 is a little narrow yellow spot on each.

A. celtis is yellow green over dorsal area, blue-green on the sides; in middle of dorsum is a pale yellow stripe, and on this a deep yellow oval spot is set on the anterior end of each segment from 3 to 12 or 13; sometimes the stripe is wanting, but the spots are always present; these are larger than any on *alicia*, each occupying more than half the breadth of the segment.

These differences in the larvae are decisive of the distinctness of the butterflies. The eggs are alike; the chrysalids are closely alike. Mrs. Peart, who has made drawings of both chrysalids, has called my attention to the serrated edge of the carina on abdomen of *alicia*, as being different from that of *celtis*, which the drawings represent as evenly edged, but I do not happen at present to have a chrysalis of *celtis* at hand for more exact comparison.

LARVA OF *EURYCREON RANTALIS* GUEN.

BY FRANCIS HUNTINGTON SNOW, LAWRENCE, KANS.

THE LARVA of *Eurycreon rantalis* is reported by Prof. F. H. Snow to have caused serious injury to various garden vegetables, weeds and other low and tender plants (a list of which is given below), in Kansas, in June and July, and a description of the larva is given by him in the *Lawrence (Kans.) daily journal*, 28 July 1880. To preserve this description from loss or render it more accessible to entomologists generally, it is here reproduced, with Prof. Snow's permission:—

Head pale yellowish red without spots. Body nearly cylindrical, about 25 mm. long. Color, light green with a narrow yellowish white band on each side of dorsal surface except on second segment. Segment 2 (the head is segment 1) has a single short longitudinal jet black dash between dorsal and stigmatic surfaces on each side, with traces of a second and third spot in some individuals. Segments 3 and 4 have each two such spots on each side. Segments 5 to 12 inclusive have each three circular jet black spots on each side at the vertices of the angles of an imaginary equilateral triangle having two angles on the anterior half of the segment and one on the posterior half. In some individuals these black spots are minutely pupiled with light green. From the lower of the three spots proceeds a single central yellowish hair. Below this lower spot upon each side of each segment may be detected an exceedingly minute black dot, which would easily escape the ordinary observer. The thirteenth or anal segment has two large black spots on dorsal line and one small black spot on each side. The lower surface of each segment has a transverse series of eight annular black spots. The second, third, and fourth segments have each a pair of true legs, and segments 7, 8, 9, 10 and 13 a pair of prop legs.

The plants upon which this larva was found are: Sweet potato (*Ipomoea batatas*), alfalfa (*Medicago sativa*), beets (*Beta vulgaris*), peas (*Pisum sativum*), pigweed (*Amarantus*), purslane (*Portulaca oleracea*).

PSYCHE.

CAMBRIDGE, MASS., OCT. 1880.

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Works on subjects not related to entomology will not be reviewed in PSYCHE.

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REVIEW.

LORD WALSINGHAM'S Illustrations of typical specimens of . . . N. A. *tortricidae* [PSYCHE, Rec., no. 1943] is one of the most valuable contributions to our knowledge of the North American *tortricidae* that has yet appeared. In it a large number of new species, mainly from the Pacific Coast, are described, and the North American species of the *tortricidae* published by Walker, are re-described with colored figures of all the new and re-described species. So far as the species of Walker are concerned, the work is worthy of especial commendation, and the students of this group of insects are under great obligations to his lordship for providing them with the means of recognizing these species, for the original descriptions are to a great extent of no value whatever.

Lord Walsingham has in this work adopted the classification of Heinemann, with some modifications in which he is, no doubt, correct, as in raising the subgenera to generic rank, which has already been done in part by others. He has avoided many errors which might otherwise have occurred, by putting himself into correspondence with Prof. Zeller, and others more or less acquainted with these insects, to whom he sent as complete suites as possible, to be compared with the previously described species of this country.

On the orthography of certain names there will, doubtless, be a difference of opinion. Many agree in changing the spelling of a word from that given by the original author to one more consistent with the derivation, and Lord Walsingham, in a letter received since the publication of his work, says, "I shall be grateful to you in any review of my work to correct *Cochylis* to *Conchylis* with my entire concurrence." I am of the opinion that we are justified in making this change, and in accordance with this principle *Lozotaenia* becomes *Loxotaenia*.

For the Californian species *cuneanum*, the genus *Hendecastema* is established, but this species is identical in its structure with *humerosana* which Clemens published in 1860, and for which he established the genus *Amorbia*. I am very sure his lordship did not have an example of *humerosana* at the time he published this work, else he would have noticed the generic relation, and would have placed his *cuneanum* in the genus *Amorbia* of Clemens.

The species "*Cenopis*" *pulcherrimana* and "*C.*" *demissana* belong to the genus *Dichelia*, while "*Begunna*" *xanthoides* Walk. belongs to *Oenectra*.

Sericoris foedana Clem. is given as a synonym of *Penthina hebesana* Walk. This is an error for which I am responsible, but at the time I had good reason for my opinion; I now have the type of *foedana* before me and it proves to be distinct from *hebesana* but identical with *Sericoris concinnana* Clem., which is a true *Exartema* and must be known as *Exartema concinnanum* Clem.

Exartema griseoalbanum Walsingham is a true *Penthina*, as shown by the males in my collection. The type was a female and the generic characters show only in the males.

It is a pleasure to review a week of such positive merit, prepared, as it has been, with such remarkable care.

C: H: FERNALD.

IN MEMORIAM.

Our faithful compositor and efficient assistant in the work of publishing PSYCHE, Edwin Charles Prentiss, born at Foxcroft, Me., 2 June 1848, died at Brighton, Mass., 25 Dec. 1880, of consumption, after a long illness, while at work upon this October 1880 numero of PSYCHE. —— We will endeavor to make arrangements as soon as possible to continue the work thus interrupted.

B: P. M.

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [ ], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

Corrections of errors and notices of omissions are solicited.

Academy of natural sciences, *Philadelphia, Pa. —Entomological section.* Advertisement. (Proc. m. meetings entom. sect. acad. nat. sci. Phil., [16 Apr. 1879], p. 1.)

Announcement of the relations existing between the *American entomological society* and the *Entomological section of the Academy of natural sciences*, Philadelphia, Pa.; prospectus of the "Proceedings . . . " [*See* PSYCHE, Rec. no. 1915]. B: P. M. (1914)

Academy of natural sciences, *Philadelphia, Pa. —Entomological section.* Proceedings of the monthly meetings [1879]. [Phil., 1879.] 34 p., 25 × 14, t 14.5 × 9.8.

An abstract of these Proceedings is published in PSYCHE, July [12 Oct.], Aug. [4 Nov.] 1879, v. 3, p. 89, 104. *B: P. M.* (1915)

[**American** association for the advancement of science—*Entomological club — Boston* [*Mass.*] *meeting* (1880). Advertisement.] (Can. entom., June 1880, v. 12, p. 104.) (Amer. nat., July 1880, v. 14, p. 550; Aug. 1880, v. 14, p. 615–616.) (Psyche, May [July] 1880, v. 3, p. 71; June [Aug.] 1880, v. 3, p. 83.)

Various announcements of the annual meeting to be held 23–31 Aug. 1880. *B: P. M.* (1916)

"**Baird,** Spencer Fullerton, *ed.* Annual record of science and industry for 1878. N. Y., Harper, 1879. 17 + 715 p. O. cl., $2.

"8th volume of a series begun 1871. Summary of progress made during year in the various branches of science; each being separately treated, by eminent specialists, such as E: S. Holden, Cleveland Abbe, Profs. G: F: Barker, E: S. Dana, T. Sterry Hunt, Dr. A. S. Packard, etc. Also contains: Industrial statistics; List of scientists who died during the year; Select works on science published in 1878. Table of contents presents an analysis of the several articles. Alphabetical index."—*Title-slip registry*, June [July] 1879, v. 1, no. 6, p. 56. (1917)

Bark-lice. (Prairie farmer, 12 June 1880, v. 51, no. 24, p. 186, col. 4, 16 cm.)

[*Pulvinaria innumerabilis*] on soft maples at Chicago and Franklin Grove, Ill. ; remedies — soft soap and water, or, carbolic acid and water. *J. D. P.* (1918)

Barrois, J. Investigations on the development of the spiders. (Annals and mag. nat. hist., March 1880, s. 5, v. 5, p. 197–211, pl. 9.)

"Translated by W. S. Dallas from a separate copy, furnished by the author, of the memoir published in the '*Journal de l'anatomie et de la physiologie*,' tome xiv, p. 529–547." *G: D.* (1919)

Bates, James Elwyn. [Thoracic appendages etc.] (Can. entom., Jan. 1880, v. 12, p. 20.)

Processes on the thorax of a female *spilosoma virginica;* collecting moths about the sap exuding from new buds of a species of oak [*quercus*]. *G: D.* (1920)

Beal, F. E. L. Tardigrades and eggs. (Amer. nat., Aug. 1880, v. 14, p. 593–594, il.)

Macrobiotus (?) lays its eggs in its cast-off skin. *G: D.* (1921)

Beal, W. J. The agency of insects in fertilization. (Amer. nat., March 1880, v. 14, p. 201–204.)

Records briefly the results of experiments made by students of the Michigan Agricultural College, under the direction of Prof. Beal. *G: D.* (1922)

Bed bugs swarming in nests of the house swallow in New Mexico.] (Cultivator and country gent., 3 June 1880, v. 45, no. 1427, p. 358, col. 3, 2 cm.)

J. D. P. (1923)

Befruchtung (Die) von *erica carnea.* (Kosmos [Leipzig], July 1879, bd. 5, p. 300, 23 cm.)

Discussion of the question whether *bombus* fertilizes *e. carnea.* *G: D.* (1924)

Bod, Lewis. Carnivorous wasps. (Nature, 8 Apr. 1880, v. 21, p. 538.)

Wasp seen eating a fly. *J. M. W.* (1925)

B., J. H. Memoir of the late Professor Jacob Boll. (The Dallas [Tex.] d. herald, 28 Oct. 1880, v. 30, no. 20, p. [6], col. 1, 42 cm.

B. 29 May 1828, in the canton of of Aargau, Switzerland; d. 29 Sept. 1880, in camp on Red River, Wilbarger Co., Texas. *B: P. M.* (1926)

Boll, Jacob, *see* B., J. H., Memoir of the late Professor Jacob Boll [PSYCHE, Rec., no. 0403.]

Boll, Jacob, Death of *Prof.* (The Dallas [Tex.] d. herald, 5 Oct. 1880, v. 27, no. 273, p. 2, col. 2–3, 21 cm.

Announcement of Boll's death; enumeration of his family and of official positions held by him. *B: P: M.* (1927)

Bowles, G: H. Annual meeting of the Montreal branch [of the Entomological soc. of Ontario, Canada]. (Can. entom. June 1880, v. 12, p. 119.)

Report of proceedings of the 7th annual meeting, held 17 May 1880. *G: D.* (1928)

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Notice of a paper by E: K. Brandt before the zoological section of the sixth assembly of Russian naturalists and physicians. *G: D.* (1929)

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How to collect insects in towns. *G: D.* (1931)

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Remnants of gills found in *euphaea*. This insect also has non-striated muscular fibres in its gills. *G: D.* (1934)

Hagen, Hermann August. The exceedingly numerous appearance of a phryganid. (Can. entom., June 1880, v. 12, p. 108.)

Brachycentrus fuliginosus very abundant at Birmingham, Conn. *G: D.* (1935)

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Record of opinions and experiments to show that yeast-fungus kills insects. *G: D.* (1936)

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The following species described by Francis Walker, from North America, are re-described and colored figures given of each: *Teras pulverosana* = *Sciaphila implexana*, *T. rostrana* = *T. restitutana* = *T. connexana*, *T. albaniana*, *T. obsoletana*, *T. directana*, *Begunna xanthoides* = *Teras xanthoides*, *Tortrix patulana*, *T. conflictana*, *Lophoderus? semiferanus*, *L. melaleucanus* = *Conchylis invexana*, *Cacoecia transiturana*, *C. triferana* = *C. velutinana*, *Dichelia furcatana*, *Sciaphila afflictana*, *S. hebesana* = *Carpocapsa inexpertana*, *S. puncticostana*, *S. confixana* = *S? perductana*, *S? ferriferana*, *S. improbana* = *Paedisca diffinana*, *S. perstructana*, *Retinia argyrospila*, *R. georgiana*, *Conchylis floccosana*, *C. scissana*, *Penthina subnivana*, *P. dealbana*, *P. resumptana*, *P. transmissana*, *Paedisca inquietana*, *P. cataclystiana*, *Affa bipunctella*, *Grapholitha strenuana* = *G. exvagana*, *G. solicitana*, *G. refusana*, *G. discigerana* = *G. metametana*, *G. apicana*, *G. divisana*. Most of these species are referred to other genera, those being the ones to which they more properly belong. *C: H: F.* (1942)

ENTOMOLOGICAL ITEMS.

"In my opinion you not only render service to science by the publication in your columns of original memoirs on general entomology, but you are and will be still more more useful to savants by your bibliographical record."—A. Robin, *Paris, France*, 4 Feb. 1880.

Though but indirectly entomological, by serving as a guide to the newspapers in the United States, where entomological articles may be found, *Rowell's Newspaper Directory* may be mentioned here as the one great authority upon its subject. We as bibliographers may strain a point to call attention to the foremost work of its kind.

Under the name of *Société d'Etudes Zoologiques*, a society has recently been established in Paris, for the purpose of forming a library of general zoology, from which books may be loaned to members living at a distance from great libraries. The members, moreover, exchange analyses of recent works, and the officers undertake to make bibliographical researches in the libraries of Paris for their colleagues residing elsewhere.

Dr. Oskar Krancher, of Leipzig, son of Mr. L. Krancher, the editor of the *Deutscher Bienenfreund*, will soon publish a dissertation containing the results of his studies upon the stigmata of insects. These studies were made in the zoological laboratory of Leipzig university, during the past summer, under the direction of Professor R. Leuckart.

The French government are trying to introduce the culture of the vine in New Caledonia. The grasshoppers will not allow the sugar-cane to grow, and they soon strip maize; so that the people have to import from Sidney what would grow luxuriantly on their own land were it free from these pests.—*Colonies and India*, 23 Oct 1880, p. 9.

Energetic measures are being taken by the government [of Cyprus] for the suppression of the plague of the locust, each inhabitant being bound to send in eight okes (about 19 lbs.) [really 22.63 lbs. = 10.26 Kg.] weight of locust eggs. Many thousand pounds weight are thus sent in and destroyed.—*Colonies and India*, 6 Nov. 1880, p. 13.

SOCIETY MEETINGS.

The regular meetings of the Cambridge Entomological Club will be held at 19 Follen St., at 7.45 p. m., on the days following:—

8 Oct. 1880.
12 Nov. „
10 Dec. „
14 Jan. 1881.
11 Feb. „
11 Mar. 1881.
8 Apr. „
13 May „
10 June „

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following:—

27 Oct. 1880.
24 Nov. „
22 Dec. „
26 Jan. 1881.
23 Feb. 1881.
23 Mar. „
27 Apr. „
25 May „

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following:—

8 Oct. 1880.
12 Nov. „
10 Dec. „
14 Jan. 1881.
11 Feb. „
11 Mar. 1881.
8 Apr. „
13 May „
10 June „

James H. Ridings, *Recorder.*

The semi-annual meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following:—

13 Dec. 1880.
13 June 1881.

James H. Ridings, *Recording Secretary.*

The regular monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following:—

7 Sept. 1880.
5 Oct. „
2 Nov. „
7 Dec. „
4 Jan.1881.
1 Feb. „
1 Mar. „
5 Apr. „

G: H. Bowles, *Secretary.*

PRIZE ESSAYS.

Due 15 Oct. 1882.—Life-histories of *Sclerostoma syngamus* and of *Strongilus pergracilis*. See Psyche, v. 3, p. 59.

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VI. Jahrg. 1880.

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The undersigned is desirous of obtaining by exchange or otherwise specimens of as many species of the COCCIDAE as possible, for the purpose of making a study of the North American forms. Those found infesting cultivated plants especially desired. Living specimens preferred when they can be obtained.

J. HENRY COMSTOCK,
Department of Agriculture,
Washington, D. C.

No. 77 was issued 15 Dec. 1880.

PSYCHE,

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

[Established in 1874.]

EDITED BY

George Dimmock, *Cambridge, Mass.;* B: Pickman Mann, *Cambridge, Mass.,*
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Cambridge, Mass.; Joseph Duncan Putnam,
Davenport, Iowa.

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Vol. 3. No. 79.

Nov. 1880.

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Cambridge, Mass., U. S. A.: Published by George Dimmock.

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[Entered as second class mail matter.]

PSYCHE, Organ of the Cambridge Entomological Club.

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PSYCHE.

FURTHER NOTES ON SOME TINEID LARVAE.

BY VACTOR TOUSEY CHAMBERS, COVINGTON, KY.

Phyllocnistis. In a former numero (v. 3, no. 73, p. 67) I have stated that larvae of this genus molt only twice; becoming pupae at the second molt. This statement was the result of careful examinations of numerous mines and larvae, but since it was made accident has revealed what careful observation failed to discover. A short time since I observed in a mine a larva with the anterior segments so much swollen as to give the larva the appearance of a small paddle, and on removing it from the mine I found that it was in the act of molting. There are therefore three molts in this genus. This larva was only one-third grown, measuring only about 1.3 mm. in length, whereas the mature larva measures about 3.9 mm., but there is no intervening molt, as frequent and careful observation has shown beyond a doubt. There may be an earlier molt, but if so I have failed to find any indication of it; if there is, then according to the regular ratio which obtains in the sizes of allied genera the larva ought then to be 0.65 mm. long.

These larvae, and those of most other leafminers, are translucent, and filled with the green parenchyma in which they are embedded, so that in their younger stages it is not only almost impossible to know whether or not they are molting, but it is difficult even to detect their presence in the leaf until they are one-third grown.

The full-grown larva, before it assumes the second form of trophi, has eight pairs of lateral pseudopodia, which are membranous, retractile and not armed with either claws or tentacles; the first two pairs, placed on the first and second abdominal segments, are smaller than the others; there are also two long membranous retractile processes at the anal end, which seem to represent the anal prolegs of lepidopterous larvae. The pupal state continues eight days in summer, and the imago hibernates. In the last larval stage the trophi are so much aborted that it is difficult to tell what organs they represent; they are figured too distinctly, *ante* p. 67. The organs of the imago can be discovered within those of the pupa on the third day after the latter is disclosed and perhaps even earlier.

Nepticula. What is written above as to the difficulty of observations on young larvae of *Phyllocnistis* applies equally to the larvae of this genus. Until recently only one larval molt — that by which the pupa is disclosed—has been known in this genus. Another, earlier, molt has, I believe, been observed in a European species, and according to my observations (given below) the number does not seem to be the same in all the species. The larval life in the mine is too short to allow of more than one molt, though I find that I formerly limited it too greatly in stating that it lasted only thirty-six or forty-eight hours. It is true that in many species it does not continue longer than two or three days after the mine becomes distinctly visible to the unaided eye; but there is an earlier period in such cases, lasting three or four days, when the mine can only be discerned by holding the leaf up to the light, and examining it with a lens, yet even then I have not succeeded in finding any other molt than that which discloses the pupa. Thus in

N. fuscotibiaeella Clem. I have found the larva when its length did not exceed 0.85 mm., and the mine itself was only 1.3 mm. long, and have watched it then for seven days more until it left the mine to pupate and yet have failed to find any indication of a molt. The mine is already about 19 mm. long before it becomes distinctly visible; but is no wider than the body of the larva; its total length when the larva quits it is about 40 mm. The larva is of a pale straw yellow, and when full-grown is about 3.2 mm. The young larva is embedded in the yellowish green parenchyma and therefore is even more difficult of observation than the larva of *Phyllocnistis*, which lies immediately beneath the cuticle of the leaf; the space mined by it at night, when I could not observe it, shows that it had not molted at night. I detected no molt other than that which discloses the pupa. This species mines the leaves of various species of willow (*Salix*). It was first described by Dr. Clemens from captured specimens, and subsequently I described it also from captured specimens as *N. ciliaefuscella*, suggesting that it might be *N. fuscotibiaeella*. Afterwards I bred it from willow leaves, recognized the identity of the species, and suggested that there were two other *Nepticula* which also mine willow leaves, one of which, unlike all other known *Nepticula*, mines the under surface. The other miner of the upper surface still remains unknown, but the miner of the under surface proves to be *N. fuscotibiaeella*. The egg, like all *Nepticula* eggs that I have seen, is a dark brown roundish or oval microscopic speck attached to the surface of the leaf.

When it is attached to the upper surface the larva mines in the parenchyma nearest to that surface, but when it is attached to the under surface, it mines nearest to that, unless it has previously eaten through to the upper side as it frequently does early in life. In the latter part of its larval life the entire parenchyma is eaten out, so that it cannot then be said to be a miner of either surface. The egg of *Lithocolletis celtisella* Cham. is deposited on the under surface of leaves of *Celtis*, but the larva early in life eats through to the upper surface and becomes a miner of that surface. With the exception of these two species all of the mines that I have examined are under the surface to which the egg is attached, and the larva, or imago, leaves the leaf through that surface.

I have alluded above to the fact that it feeds at night as showing that it could not then have passed a molt which escaped me, but this habit is not peculiar by any means to this species. No leaf-mining larva has ever been "caught napping" by me. If they ever sleep they do so either while still eating or molting or they take very short "cat naps." I have frequently found them when they were not feeding, but they were either molting, sick, parasitized or alarmed.

The cocoon of this species is slightly reniform, about 2 mm. long and of a bright golden yellow. The larval life does not exceed eight days in the mine, and is therefore half as long as that of

N. pteliaeella, a new species of which the imago is yet unknown. Its food plant, *Ptelia trifoliata*, called also "Hop bush," or "Bush clover." is by no means abundant in this locality (Covington, Kentucky), at least I have but seldom met with it; but where I have found it in August, every leaf is always mined by the larvae of this species, and many leaves have as many as forty larvae in each. The larva is bright green, the intestine being filled with blue-green pellets looking sometimes almost like indigo. It undergoes two molts while still in the mine, besides that in the cocoon by which the pupa is disclosed. Abundant as are the mines, I have never seen the egg even on the youngest mines. It seems to become soon detached from the leaf and lost. The mine is at first an oval or irregularly roundish blotch about 2 mm. in diameter, made by eating out the parenchyma around the spot at which the larva enters the leaf and the entire parenchyma is eaten out. About three days are consumed in making this part of the mine, but as it was already begun in each instance I cannot be more exact as to the time. The larva is now 0.8 mm. long; it ceases to feed and undergoes its first molt. This occupies *not less* than forty-eight hours; I cannot be more exact because in every instance the molt was either begun or ended in the night. The molt accomplished, it begins to feed again, leaving its little blotch and making an exceedingly serpentine or zigzag track, packed densely with little green pellets of frass placed transversely. The mine is linear and no wider than the body of the larva; the parenchyma next to the under surface is not eaten; and if the larva happens to strike a vein in its course the mine ceases to be crooked, and passes straight along the vein. This part of the mine is very distinct from that of the first stage, is about 23 mm. long, and it takes the larva three days to make it. Feeding then ceases, and forty-eight hours are consumed in the second molt, which being finished, feeding begins again. At the beginning of this molt the larva is 1.6 mm. long, having just doubled its length since the first molt. The mine of the third stage is similar to that of the second, though readily distinguishable from it by being a little wider, and having the transverse rows of frass not so densely packed —a little wider apart—and the frass black instead of green, and in the last part of it (for 12 mm. before the end) it is placed in a central line, and not in transverse rows. This part of the mine is so crooked that it is impossible to give its length accurately, but it is more than 75 mm. long, and that of the whole mine is not far from 110 mm., or twice as great as that of *N. fuscotibiaeella*. No molt occurs in this part of the mine, which is made in six days, equal to the other two stages combined, and making the larval life in the mine sixteen days — about twice that of *N. fuscotibiaeella*. The length of the larva at the end of this stage is 3.2 mm., just twice what it was at the second molt. (*To be continued on p. 147.*)

PSYCHE.

CAMBRIDGE, MASS., NOV. 1880.

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SOME RECENT PUBLICATIONS ON FOSSIL INSECTS.

It is not often that we can record any considerable accession to the literature of fossil insects, and therefore it is worth while to call attention to the writings of Mr. Goss, of England, upon this subject, whose papers,* appearing at intervals during the past three years, not only form an important contribution, but, now that they are completed, have a unity and completeness worthy of remark.

They make no pretension to originality, but are a pains-taking compilation of general results reached by a broad survey of the literature, with full references, which show that no important contribution to the subject, and scarcely a minor tract, whether in Europe or America, has escaped the vigilance of the author.

As completed, Mr. Goss's essays form two series; one of three essays, first published in the *Proceedings of the geologists' association;* the other of twelve minor papers, which originally appeared by instalments in the *Entomologists' monthly magazine*, and have since been issued as a separate tract. The first series consists of 128 pages, and the second of 50 pages, both in octavo. Both treat the subject from a geological standpoint, i. e., each geological formation is separately considered, — in the first series in a descending, in the second in an ascending order. They differ however in that the papers of the first series enter more fully into details concerning the insects, and have appended to them lists, for the earlier periods of the species, for the later periods of the genera of known forms; the lists are bare catalogs under the mention of the papers in which they are treated. The second series of papers consists, as it were, of an abstract of the other, but is also accompanied by very full references to the papers (in foot notes), and by statements, for each formation, of the progress of vegetable and of other animal life, for comparison with the advance in development of insect types. Our author here wisely chooses the ascending instead of the descending order, as in the other series, where the order was less material.

The success which has attended this venture of Mr. Goss in a difficult field, in which he has shown great carefulness and industry, lead us to hope — the more that he is known as an entomologist, rather than as a geologist — that, if he will not join the all too feeble band of original investigators in the field, he will at least complete the picture by treating the entire subject from an entomological standpoint. *Samuel H. Scudder.*

REVIEW.

Cecil's books of natural history, by Prof. S. H. Peabody [see Rec., no. 1982], consist of carefully prepared short chapters on the more important general groups of the higher animals, illustrated with well-executed woodcut plates, and are a valuable contribution to the too small number of popular and interesting American works upon natural history for children.

They treat, to a greater extent than has hitherto unfortunately been usual in American books of this class, of the indigenous insects, which children can be led to observe for themselves, and convey a large amount of accurate information in a form that can easily be understood. *B: P. M.*

---

* Goss, Herbert. Three papers on fossil insects, and the British and foreign formations in which insect remains have been detected. No. 1. The insect fauna of the recent and tertiary periods. No. 2. of the secondary or mesozoic period. No. 3. of the primary or paleozoic period. From the Proceedings of the geologists' association, vols. 5-6. [London, 1878-1880.] 8°

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Corrections of errors and notices of omissions are solicited.

Abbe, Cleveland. A relation between meteorology and the grasshopper or locust pest. (Amer. nat., Oct. 1880, v. 14, p. 735–738.)

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How to distinguish, on wings of hymenoptera, the lines of folding which they had in the pupal state, by means of the hairs and tracheae of the wings. *G: D.* (1945)

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Chambolle, F. Sur les mœurs de l'*hydrophilus piceus.* (Feuille des jeunes naturalistes, Sept. 1880, an. 10, p. 147.)

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Swarming of *liparis salicis, pyrameis cardui, orgyia pudibunda, cnethocampa processionea* and *liparis chrysorrhoea.* Reason for such superabundance of certain species; application to phylloxera. *G: D.* (1951)

Claypole, E: W. [Insects taken at Yellow Springs, O.] (Can. entom., June 1880, v. 12, p. 120.)

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D., J. D. Preservative against the ravages of termites or white ants. (Colonies and India, 23 Oct. 1880, p. 17, 2 cm.)

Inquiries about patenting such a preservative; answered by R. E. C. (Colonies and India, 30 Oct. 1880, p. 17, 3 cm.) *G: D.* (1954)

Domesticating the tusser silkworm. (Journ. applied sci., Dec. 1880, v. 11, p. 186–187, 43 cm.)

Notes upon the habits of *antherea paphia* [=*attacus mylitta*], *actias selene* and *cricula trifenestra.* *G: D.* (1955)

Edwards, W: H: On certain species of *satyrus* [Psyche, Rec., no. 1817].

Correction by W: H: Edwards. (Can. entom., Aug. 1880, v. 12, p. 147.) *G: D.* (1956)

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Description of egg, larva in different stages, and chrysalis of *a. cybele*. Mode of keeping larvae at freezing temperature through the winter, and results. *G: D.* (1958)

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Discovery of the fertile winged form of the grape phylloxera in California; means of destroying it. *B: P. M.* (1968)

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The Italian or Ligurian bee is found to fertilize the red clover [*trifolium*] in New Zealand as well as the imported humble-bee [*bombus*] does. The Ligurian variety is free from the attacks of the bee-moth to which the black variety is there subject. *G: D.* (1969)

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Abstract. (Journ. of sci., March 1880, s. 3, v. 2, p. 213). *G: D.* (1981)

Peabody, Selim Hobart. Cecil's books of natural history. 3 v. [each with sub-title] Cecil's book of beasts; . . . of birds; . . . of insects. Chic., Clarke & Co., 1869. 10 + 214 p.; 10 + 234 p.; 10 + 228 p.; 18 × 13, t 12.5 × 7.8. cl., $1.25 *each.*

Re-issue, Phil., Claxton, Remsen & Haffelfinger, 1871. cl., $1.25 *each.*

Re-issue, 3 v. in one, entitled, "Cecil's books of natural history. Part I, Beasts; part II, Birds; part III, Insects. Profusely illustrated." Phil., Claxton . . . , 1879. 15 + 674 p. il. cl. $1.75.

Re-issue, 3 v. in one, with same title, N. Y., American Book Exchange, 1879. cl., $1.25.

Re-issue, N. Y., American Book Exchange, 1880. cl. $1.00.

Notice. (Title-slip registry, Nov. [Dec.] 1879, v. 1, p. 108.)

Rev. (Psyche, Nov. 1880 [March 1881], v. 3, p. 138.)

The successive issues all printed from the same plates. The entomological portion treats of ants, bees, spiders, dragon-flies, white-ants, wasps, locusts, mosquitoes, beetles and butterflies, in a simple manner, intended to interest and instruct children. *S. H. P.* (1982)

Peabody, Selim Hobart. [Swarming of *danais archippus.*]

(Can. entom., June 1880, v. 12, p. 119–120.)

Swarming of *danais archippus* at Racine, Wisconsin, Sept. 1868. *G: D.* (1983)

Phylloxera vastatrix. Important meeting of viticulturists at Sonoma. Concerted action necessary to destroy the pest in infected districts. The future safety of our vineyards assured by the energetic recommendations and action of the State viticultural board. (San Francisco [Cal.] merchant, 30 July 1880, v. 3, no. 22, p. [1], col. 1–5, 260 cm.)

Report of meeting, at Sonoma, 23-24 July 1880, of the Board of state viticultural commissioners. Communications and addresses upon the grape phylloxera, its first appearance and spread in California, means of preventing its ravages. *B: P. M.* (1984)

Pilati [Pilate], E. Chasse aux lépidoptères. (Feuille des jeunes naturalistes, July 1880, an. 10, p. 118–119.)

Mode of capturing and killing lepidoptera. *G: D.* (1985)

Plateau, Félix. Preservation of entomological specimens. (Ann. record of sci. and industry, . . . S. F. Baird, 1876, p. 275.)

Recommends use of yellow glass in windows of rooms containing collections of insects, as a means of preserving the colors. Experiments with colored glass other than yellow mentioned. *H: W. T.* (1986)

Potato bugs (About). (N. Y. herald, 11 June 1880, . . ., 16 cm.)

Abundance of *doryphora decemlineata* in Westchester county, N. Y., and the remedies used. *G: D.* (1987)

Preudhomme de Borre, Alfred. Quelques mots sur l'organisation et l'histoire naturelle des animaux articulés, conférence donnée le 15 février 1880, à la Société royale linnéenne. (Bull. soc. roy. linn. de Bruxelles, 1879 [April 1880], v. 8, p. 119–137.)

Popular lecture upon articulates. *G: D.* (1988)

Putnam, Joseph Duncan. Biological and other notes on *coccidae*. I. *Pulvinaria innumerabilis*. II. *Aspidiotus ancylus*. (Proc. Davenport acad. nat. sci., 1879–1880, v. 2, p. 293–348, pl. 12–13.)

Separate, with t.-p. cover. Davenport, Feb. 1880. p. 293–348, 2 pl., 25 × 16, t 16.8 × 10.1.

P. innumerabilis, its synonymy, history, development, different stages and forms and their habits, internal anatomy, diseases, parasites, enemies, manner of distribution, effects on trees, remedies, food-plants (chiefly *acer dasycarpum*, *a. saccharinum*, *negundo aceroides*, and *tilia europaea*), other species of *pulvinaria;* brief account of *aspidiotus ancylus*. *G: D.* (1989)

Riley, C: Valentine. Harvest mites. (Amer. nat., Jan. 1873, v. 7, p. 16–19, fig. 5.)

Describes and figures *leptus americanus*, n.? sp. and *l. irritans*, n. sp. *G: D.* (1990)

Riley, C: Valentine. Notes on the apple-worm. (Amer. nat., Aug. 1879, v. 13, p. 523-524.)

The freedom of Michigan apples from *carpocapsa pomonella* probably due to the general failure of the apple crop in 1877, and to the efforts made to prevent the ravages of this insect. From a paper before the Missouri State Horticultural Society, 1879. *G: D.* (1991)

Riley, C: Valentine. On the oviposition of the yucca moth [*pronuba yuccasella*]. (Amer. nat., Oct. 1873, v. 7, p. 619–623.) *G: D.* (1992)

Rogers, R. Vashon. Entomology for beginners. Tiger beetles. (Can. entom., April 1880, v. 12, p. 61–65, fig. 10–15.)

Figures *cicindela vulgaris*, *c. purpurea*, *c. sexguttata*, *c. hirticollis*, *c. generosa*, and a larva of *cicindela:* notes on their habits. *G: D.* (1993)

DE **Rossi**, G. Eine sonderbare Mésalliance. (Entom. Nachrichten, 15 March 1880, jahrg. 6, p. 57.)

Copulation observed between a male *agelastica halensis* and a female *chrysomela brunsvicensis.* *G: D.* (1994)

Sanborn, Francis Gregory. Collections of the late Dr. Asa Fitch. (Can. entom., April 1880, v. 12, p. 66–67.)

Descriptive of A. Fitch's collection and its condition. Nearly the same description is contained in PSYCHE, Sept.–Dec. 1879 [9 April 1880], p. 273–275. *G: D.* (1995)

Saunders, W: Entomology for beginners, no. 2. (Can. entom., Jan. 1880, v. 12, p. 4–6, fig. 1–3.)

Figures and describes *catocala ultronia* and describes its larva; figures *psenocerus supernotatus* and *aegeria tipuliformis*, habits of the former. *G: D.* (1996)

Saunders, W: Entomology for beginners. The common woolly bear, *spilosoma virginica.* (Can., entom., March 1880, v. 12, p. 56-57, fig. 9.)

Figures and briefly describes larva, pupa, and female imago of *s. virginica.* *G: D.* (1997)

Schnabl, Johann. Ueber Libellenschwärme. (Entom. Nachrichten, 1 Aug. 1880, jahrg. 6, p. 167.)

Flight of great numbers of *libellula quadrimaculata* through Warsaw, Poland, 14-16 May 1880. A flight of *l. flavomaculata* noted at Warsaw, 6-7 June 1880. *G: D.* (1998)

Scudder, S: Hubbard. A few notes on N. American *acridii.* (Can. entom., April 1880, v. 12, p. 75-76.)

Synonymy of a few species of *pezotettix*, *caloptenus* and *melanoplus;* describes *bradynotes*, a new genus, of which *pezotettix obesa* is the type and the only known species. *G: D.* (1999)

Scudder, S: Hubbard. The entomological libraries of the United States. (Bull. of the libr. of Harvard university, 1 Jan. 1880, no. 14, v. 2, p. 20-23.)

Separate. (Lib. Harvard university. Bibliographical contributions, no. 11.) Republished from the Bulletin of the library of Harvard university, no. 14. Cambridge, Mass., 1880. 6 p., 25 × 17.5, t 20 × 13.

Notice. (Amer. nat., June 1880, v. 14, p. 466.)

Size and specialties of the largest public and private entomological libraries of the United States. List of 69 rare entomological works found in the different libraries of the vicinity of Cambridge, with indication of the libraries possessing each work. *G: D.* (2000)

Silkworm-gut. (New remedies, June 1880, v. 9, p. 180, 8 cm.)

Sources of silkworm-gut and foodplants of the so-called "camphor-worm" of Japan. *G: D.* (2001)

Smith, Worthington G. Carnivorous wasps. (Nature, 15 April 1880, v. 21, p. 563.)

Observed wasps attacking and killing *bombus*, *calliphora* and *apis;* the garden was full of flowers and the wasps seemed to be lying in ambush for the bees. *J. M. W.* (2002)

[**Société** helvétique des sciences naturelles.] 62ème session, réunie à Saint-Gall les 10, 11 et 12 Août 1879. (Archives des sci. phys. et nat., 15 Dec. 1879, per. 3, v. 2, p. 677-723.)

Contains abstract of paper by Dr. V. Fatio upon phylloxera in Switzerland (p. 708-711), and of a paper by F. A. Forel on his experiments upon the larvae of the *hydropsychides* (*tinodes lurida*) which sculpture the rock of the bed of Lake Geneva. *G: D.* (2003)

Sprague, Frank Headley. Notes from Wollaston, Mass. (Can. entom., May 1880, v. 12, p. 100.)

Notes on *colias philodice*, *c. eurytheme*, *limenitis arthemis*, and *junonia coenia.* *G: D.* (2004)

Taschenberg, O: Die Flöhe. Die Arten der Insektenordnung *suctoria* nach ihrem Chitinskelet monographisch dargestellt. Mit 4 lithographischen Tafeln. Halle, Max Niemeyer, 1880. t.-p. cover, 120 [+ 2] p., 4 pl., 25 × 18.5, t 19 × 13. 7 M.

Correction, by E. Ehlers, entitled, "Berichtigungen." (Zool. Anzeiger, 23 Aug. 1880, jahrg. 3, p. 429-430.)

General anatomy; systematic arrangement; divides the order *suctoria* into 2 families, *sarcopsyllidae* (containing *sarcopsylla penetrans*, *s. gallinacea*, and *rhynchopsylla pulex*) and *pulicidae*, of which an analytical table of 3 genera and 21 species is given; description, synonymy and habits of the 24 species (of 5 genera) of *suctoria* seen by the author; describes 2 new genera (*hystrichopsylla* and *typhlopsylla*) and 9 new species (none from N. A.); notes upon or quoted descriptions of 10 species not seen by the author; remarks on the distribution of *sarcopsylla penetrans* and *pulex irritans;* catalog of animals on which or in the nests of which fleas have been found, with names of the latter; alphabetical index of species described and of synonyms; alphabetical list of 101 works cited by the author; plates. *G: D.* (2005)

Tessier, Lucien. Chasse d'hiver. (Feuilles des jeunes naturalistes, April 1880, p. 82-83.)

Many insects are not killed by the cold of winter. List of coleoptera taken 15-20 Feb., at Kichompré, near Gérardmer, Vosges, France. *G: D.* (2006)

Thaxter, Roland. Swarming of *archippus.* (Can. entom., Feb. 1880, v. 12, p. 38-39, fig. 6.)

Swarms of *danais archippus* seen in Apalachicola, Florida, in the winter of 1875-76. Figures a twig full of butterflies to illustrate how thick they were upon it. *G: D.* (2007)

ENTOMOLOGICAL ITEMS.

Henry Holt & Co., of New York, will soon publish a general illustrated work, by Samuel Hubbard Scudder, on the structure, metamorphoses, habits, ornamentation, dimorphism, ancestry, and other peculiarities of butterflies, including life-histories of a large number of North American species.

Dr. Auerbach, writing to the "Chemiker-Zeitung," mentions as a curious fact that during an entire summer he observed water-beetles — probably *Gyrinus natator* — living in tanks of a saturated solution of Glauber's salt. When alarmed the beetles took shelter under the crystals, just as they do in ordinary circumstances under water plants. A little of the liquid so harmless to insects, having found its way by leakage into an adjoining river, proved fatal to multitudes of fish. — *Journ. of sci.*, March 1880, p. 213.

At the sixty-eighth meeting of the Société Helvétique des Sciences Naturelles in Brigue, 13-15 September 1880, Mr. Joseph Anderegg, of Gamsen, a village near Brigue, exhibited a fine collection of about a thousand species of the lepidoptera of the region. Many of the species were represented by numerous specimens, and the collection, which gave a good idea of the lepidopterous fauna of the Simplon region, was very finely prepared and preserved.

The U. S. Entomological Commission designs preparing for publication a bibliography of the economic entomology of the United States and Canada, in the same style as the Bibliographical Record of Psyche. This bibliography will contain references to papers, articles and notes in agricultural and popular scientific periodicals, and in journals devoted to bee culture, and as complete as possible references will be made to notes on economic entomology in those periodicals which appeared prior to 1850. The compiler, Dr. A. S. Packard, jr., Secretary of the commission, requests that authors will forward to him, at Providence, R. I., full records of their publications upon this subject, made out in the adopted style.

SOCIETY MEETINGS.

The regular meetings of the Cambridge Entomological Club will be held at 19 Follen St., at 7.45 p.m., on the days following: —

8 Oct. 1880.
12 Nov. "
10 Dec. "
14 Jan. 1881.
11 Feb. "
11 Mar. 1881.
8 Apr. "
13 May "
10 June "

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following:—

27 Oct. 1880.
24 Nov. "
22 Dec. "
26 Jan. 1881.
23 Feb. 1881.
23 Mar. "
27 Apr. "
25 May "

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following: —

8 Oct., 1880.
12 Nov. "
10 Dec. "
14 Jan. 1881.
11 Feb. "
11 Mar. 1881.
8 Apr. "
13 May "
10 June "

James H. Ridings, *Recorder.*

The semi-annual meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following: —

13 Dec. 1880.
13 June, 1881.

James H. Ridings, *Rec. Sec'y.*

The regular monthly meetings of the Montreal Branch of the Entomological Society of Ontario will be held at Montreal, Que., Canada, on the days following: —

7 Sept. 1880.
5 Oct. "
2 Nov. "
7 Dec. "
4 Jan. 1881.
1 Feb. "
1 Mar. "
5 Apr. "

G: H. Bowles, *Secretary.*

PRIZE ESSAYS.

Due 15 Oct. 1882.— Life-histories of *Sclerostoma syngamus* and of *Strongilus pergracilis.* See Psyche, v. 3, p. 59.

ADVERTISEMENTS should reach the editors by the 10th of the month preceding the one in which they are to appear.

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Department of Agriculture,
Washington, D. C.

No. 78 was issued 12 Feb. 1881.

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ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

[Established in 1874.]

EDITED BY

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Albert J: Cook, *Lansing, Mich.;* Clifford Chase Eaton,
Cambridge, Mass.; Joseph Duncan Putnam,
Davenport, Iowa.

Vol. 3. No. 80.

Dec. 1880.

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Cambridge, Mass., U. S. A.: Published by George Dimmock.

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PSYCHE.

FURTHER NOTES ON SOME TINEID LARVAE.

BY VACTOR TOUSEY CHAMBERS. COVINGTON, KY.

(*Continued from page* 137.)

The regular ratio of growth between the different stages of these minims would scarcely be believed by one unfamiliar with such facts; thus the lengths of this species (*N. pteliaeella*) at its several molts are, as above stated, 0.8, 1.6, and 3.2 mm., and to adopt the language of the anthropologists, its "cranial capacity," as indicated by the width of the head at the widest point, is in the different casts of the same larva, 0.0825, 0.165, and 0.33 mm.

The mine is a very pretty one; and several of them together give to a leaf a very singular appearance. The mines frequently cross themselves and each other, and sometimes almost the entire contents of a leaf are eaten out. There is a similar mine in oak (*Quercus*) and another in hickory (*Carya*). In these however there is no little blotch at the beginning, the frass is deposited in a central line in the first part (corresponding to the first stage of larval life?), as it also is in the last 12 mm. of the mine, as in this species. This last character is preparatory to leaving the mine to pupate, and does not indicate a molt accomplished, as the other changes in the character of the mine do; but it is probable that every change in the mode of feeding, and in the character of the mine, and every decided break in the continuity of the frass made by a larva in early life, indicates that it has just completed a molt. Yet there are many *Nepticula* mines in which I have not only failed to find any molt, but also have failed to find any indication of one. Perhaps the enlargement of the mine of *N. fuscotibiaeella* two days before it ceases to feed may indicate that a molt then takes place, but I have not found that its does.

The only cocoons that I have seen were yellowish green and about 2 mm. long; they were between the side of the glass breeding jar and the earth in the bottom of it. Does it pupate under ground?

Aspidisca saliciella Cham. The egg is deposited usually at the side of the midrib in willow leaves [*Salix*]; the larva makes a mine just wide enough to hold it, along the midrib, and 2.12 mm. long; here it undergoes its first molt, being at the time 1.06 mm. long. It then leaves the midrib and makes a clavate mine 3.36 mm. long, when it undergoes its second molt, being now 2.12 mm. long. It then eats out the parenchyma, making a small irregular roundish blotch from which it cuts out the little oval case in which it pupates. Its length after it has finished feeding is 4.24 mm. The larva hibernates; in all of its stages, except as hereinafter stated, it is pale yellow with a fuscous spot on the under surface of each segment except the head and anal segment, and two hairs (one of them very small) project from each side of each of the same segments. The body is cylindrical and depressed; feet are represented (?) by sucker-like discs, and the trophi from its exit from the egg are of the ordinary form, that is the spinneret, maxillae and palpi are distinct, as well as the other organs. Each molt in the mine occupies twelve hours. It is only recently that I have been able to follow its life history, having formerly supposed that it molted only once. The width of the head of each cast is, 0.101, 0.202, 0.303 mm. I give these figures as showing the regularity of the relative sizes of the same insect at its different molts. But it will be observed that there are two ratios. In *Aspidisca* and *Nepticula* the larva in each stage increases its length by adding the length of the preceding stage, as 1.06, 2.12, 4.24 mm. and 0.8, 1.6, 3.2 mm.; whilst in *Lithocolletis*, *Leucanthiza* and others the length of the larva at the end of its first stage is added in each of its succeeding feeding stages (0.81, 1.62, 2.43, 3.24, 4.05 mm.). In *Aspidisca* and others what corresponds to the third molt of *Lithocolletis* and others seems to be skipped, and a double length added at the fourth. In many larvae there is, however, a fifth molt, which seems to be the equivalent of the sixth one in *Lithocolletis*, the fifth also being skipped.

The larva undergoes another (its third) molt in its case, after the case has been attached for pupation, but previous to the molt by which the pupa is formed. If the case is opened, some days after it has been finally attached, a white silken cocoon will be found inside, fitting closely to the body of the pupa, and the cast skin will be found between the cocoon and the case. There are therefore four larval stages. In the last stage the appearance of the larva differs greatly from that of the previous stages. It is now yellow, without maculae, and the sucker-like spots on the thoracic segments have disappeared. I have long known the larva in this condition, but only recently discovered that it attained it by a third molt, though the difference in its appearance suggested as much. Prof. J. H. Comstock, in his "Report of the Entomologist of the U. S. Department of Agriculture, for the year 1879," pl. 2, fig. 2, *b* and *c*, gives figures of these last two (or third and fourth) larval stages.

The mode of progress in the larvae of *Aspidisca* is one of the most surprising in the insect world. As above stated there are no true feet or prolegs; every vestige of them has vanished except on the second and third thoracic segments, where they are represented (?) by the little sucker-like discs before mentioned. But these discs are not suckers. They are distinct depressions both on the ventral *and dorsal* surfaces. They do not exude any glutinous or other secretion by which the larva gains foothold. The larvae are thus apparently without any means of porgress. Yet encumbered by their case, and with the whole body encased except the head and first, and sometimes the second, segment, they will climb trees and fences, travel through and over grass and weeds and irregularities of ground for distances sometimes of many metres before they finally attach their cases. I was long puzzled to know how they accomplished it, supposing that it was by means of the discs, by suction or by exuding from them a glutinous secretion. Experiment and observation have solved the problem. There is no suction or secretion; and the discs have nothing to do with it; they are not organs of locomotion. The larvae travel solely by means of their silk. The head and following segment, and sometimes the next, are protruded from one end of the case (the larvae sometimes close one end and open the other), then successive taps are given with the end of the spinneret to the surface on which the larva lies, and thus a minute byssus is formed, to which the spinneret adheres; the body is then contracted so that the under surface of the case is brought into contact with the byssus and apex of the spinneret, and thus the case is attached. The head and segments are again extended, and another byssus is made, and, the body contracting, the case is again brought up and attached. Its attachment is only by a few silken threads each of which is less than 0.0002 mm. in diameter, and the fresh silk readily stretches or breaks. This is the sole mode of progress of the larva.

I have not followed the changes of *A. splendoriferella* or any of the species other than *A. saliciella;* but the mines and larvae of all resemble each other so much that there is no reason to suppose there is any difference in their histories other than such as relates to size, ornamentation and food plant.

Antispila. In this genus I know the species *nyssaefoliella*, *cornifoliella*, *viticordifoliella* and *ampelopsiella* in their last and penultimate larval stages. In their last stage all are fat, white, footless larvae; the first then having a length of 4.07 mm. when fully grown, and the last of 3.30 mm. In the penultimate stage all have the ventral maculae on all of the segments, except the head and the two hindermost segments of the abdomen. I have never seen a molt in any of the species, but there has evidently been a molt between the two stages above mentioned, and I have found the cast skin of this molt in the mines. From the size of these two stages, and from the size and form of the mine, and from analogy with *Aspidisca*, I have no doubt that there is an earlier molt which takes place in the first three above-mentioned species when the larva is about 1.35 mm. long; and in *ampelopsiella* when it is about 1.1 mm. long. I know the larvae of *A. hydrangeaeella* Cham. and *A. isabella* Clem. only in their penultimate stages. They are very much like the other larvae. *Isabella* in size agrees with *viticordifoliella*, and *hydrangeaeella* is but little larger than *ampelopsiella*. The mines of all greatly resemble those of *Aspidisca*, but are larger; and like nearly all Tineid mines known to me they are at first linear, ending in a blotch which frequently obliterates more or less of the linear part of the mine. They no doubt leave their eggs with mouth parts of the ordinary form, like *Aspidisca* and *Nepticula*.

PSYCHE.

CAMBRIDGE, MASS., DEC. 1880.

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REVIEW.

MOCQUERYS' Tératologie entomologique [PSYCHE, Rec., no. 2037] is the record of abnormal coleoptera most of which belong to the collection left by the late M. Mocquerys, of Rouen, France, at his death, 12 Feb. 1879, to the city of Rouen, for its natural history museum. The systematic and careful arrangement of this work will commend it to the use of all coleopterists. Each abnormal species is neatly figured, natural size, upon the top of a page, and, where the abnormality is in an antenna, or other part too small for convenient observation, the part itself is figured enlarged. Beneath the figures is a brief description of the abnormal part, followed by a statement of where the specimen was found, and in whose collection it is preserved. The work reflects credit upon the Société des Amis des Sciences Naturelles, under whose auspices it was published, and, upon M. Bourgeois, the secretary of the society, by whom the work was revised and put in form for publication, and by whom the views of M. Mocquerys upon the abnormalities of insects were explained in the introduction. A good work could be done for American entomology if the numerous abnormal specimens now scattered through American collections of insects were brought together, figured, and the figures published with brief descriptions. *G: D.*

PROCEEDINGS OF SOCIETIES.

LINNEAN SOCIETY OF LONDON.

17 JUNE 1880. — . . . A paper was read by Mr. F. Maule Campbell, "On certain Glands in the Maxillae of Spiders." These glands, to which he attributes a secretory function (probably salivary), are found in *Tegenaria domestica*, have apertures on the inner side of the upper face of each maxilla thence inclining towards the mouth. They are ring-like in figure, with an enclosed disk, and with tegumentary folds at their outlets. The glands and apertures increase in number with age, and the ducts tend to become chitinous. Glands varying somewhat in structure, but evidently similar in kind, exist in species of *linyphiidae*, *theridiidae*, and *epeiridae*. . . . Mr. F. M. Campbell communicated a second paper "On the stridulating organs of *Steatoda guttata* and *Linyphia terebricola*." A stridulating organ has already been described by Prof. Westering and Mason Wood in certain other spiders; the present observations demonstrate its existence in both sexes, and the essentials of the structure are now given in detail. . . . A paper by Sir John Lubbock, Bart., M. P., was read, namely, "Observations on Ants, Bees, and Wasps, with a description of a new species of Honey Ant. In this, his seventh contribution on this subject, Sir John related his fresh experiments on their powers of communication. — From *J. Murie* in *Zool. Anzeiger*, 23 Aug. 1880, p. 431-432.

CAMBRIDGE ENTOMOLOGICAL CLUB.

8 OCT. 1880. Dr. H. A. Hagen read a letter lately received from a lady residing in the suburbs of Boston, in regard to a new and very annoying household pest, the exact nature of which it had not been possible yet to determine, as no specimens had been submitted to competent inspection nor could any at this time be obtained; but the most extreme exertions, including the frequent scalding or baking of nearly every article in the house, numerous complete removals of all the furniture from room to room, and the burning of over twenty five kilograms of sulphur in a single summer, had failed to mitigate the attacks of the pest, during its period.

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [ ], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

Corrections of errors and notices of omissions are solicited.

Blanchard, F: Occurrence of *atemeles cavus* Lec. with black ants. (Bull. Brooklyn entom. soc., May 1879, v. 2, p. 4.)

Supposes that the larva may be parasitic on young ants. *F. G: S.* (2008)

[**California** — *State viticultural commission.* Report of meeting, at Sonoma, 23–24 July 1880.] (Pacific rural press [San Francisco], 31 July 1880, v. 20, p. 72–73, 110 cm.)

Means of preventing the ravages of the grape phylloxera; communications and addresses by several persons. *B: P. M.* (2009)

Chatin, Joannes. Sur la valeur comparée des impressions monochromatiques chez les invertébrés. (Comptes rendus de l'acad. des sci., 5 Jan. 1880, v. 90, p. .)

By analyzing the current of Dewar produced under the influence of different rays of the spectrum, the author has ascertained that the visual impression reaches its maximum in the articulates in the yellow-green region, while it is very feeble in the red rays. *A. R.* (2010)

Champlin, J: D., *jr.* Young folks' cyclopaedia of common things. N. Y., Holt, 1879. 5+690 p. il. O. cl., $3.

"Arranged like other cyclopaedias; designed for children, to cultivate in them the habit of consulting works of reference. Articles are written in simple language and freely illustrated; they cover most things in nature, science, and the arts which are apt to awaken a child's curiosity. Index. Author the late associate editor of the American Cyclopaedia."— *Title-slip registry*, Sep. [Oct.] 1879, v. 1, no. 9, p. 84. (2011)

Cooke, Matthew *and* Robert J. **Cooke.** Natural history and habits of the codling moth, or apple worm; also Notes on the scale insect. By Messrs. Cooke & Son, Proprietors Box Factory, Sacramento, California. Sacramento, 1879. t.-p. cover + 32 p., 16×11, t 12.7 × 8. il.

p. 1–28. Habits and seasons of *carpocapsa pomonella;* means against it. Ravages of *coccidae;* life history of *aspidiotus conchiformis* and of *a. harrisii* (by C. H. Dwinelle). p. 29–32. Advertisements. *B: P. M.* (2012)

Cooke, Robert J., *see* Cooke, Matthew *and* Robert J. Cooke, Natural history and habits . . . [Psyche, Rec., no. 2012].

Darwin, C. The sexual colours of certain butterflies. (Nature, 8 Jan. 1880, v. 21, p. 237, 29 cm.)

The wings of *diadema bolina* when viewed from behind are black, with six marks of pure white, when viewed in front the white marks are surrounded by a halo of beautiful blue. *Ornithoptera* show this also, the wings of the male are golden yellow only when viewed in front. *J. M. W.* (2013)

Dwinelle, C. H., *see* Cooke, Matthew *and* Robert J. Cooke, Natural history and habits . . . [Psyche, Rec., no. 2012].

Gissler, Carl Friedrich. Biological notes on some genera of *tenebrionidae.* (Bull. Brooklyn entom. soc., May 1879, v. 2, p. 7-8).

Had for two years specimens of *eleodes gigantea* and of *coelocnemis magna* from Cal., in breeding cages; obtained severally eggs and larvae, but no pupae. *F. G: S.* (2014)

Grote, A: Radcliffe. Three new species of *botis.* (Can. entom., Feb. 1880, v. 12, p. 36–37.)

Describes 3 new species, *b. oppilalis* (from Mass. and Me.), *b. oscitalis* (from Me. and Ohio), *b. dissectalis* (from Ontario, Canada). See correction in A: R. Grote's "[Three new species . . .]" (Can. entom., April 1880, v. 12, p. 80) [Psyche, Rec., no. 2016]. *G: D.* (2015)

Grote, A: Radcliffe. [Three new species of *botis.*] (Can. entom., April 1880, v. 12, p. 80.)

Additional note to the author's "Three new species of *botis*" (Can. entom., Feb. 1880, v. 12, p. 36–37) [Psyche, Rec., no. 2015]. *Botis dissectalis* is a synonym of *b. submedialis.* *G: D.* (2016)

[**Hagen,** Hermann August. Notice of the purchase by the Mus. Comp. Zoölogy, in Cambridge, Mass., of the library of.] (Harv. register, April 1880, v. 1, p. 83, col. 1, 4 cm.)

Size, etc., of the library. *G: D.* (2017)

Hyde, J. S. The winged phylloxera. (Pacific rural press [San Francisco], 7 Aug. 1880, v. 20, p. 81, col. 1–3, fig. 1–2, 46 cm.)

Discovery of the infertile winged form of the grape phylloxera in the Sonoma valley, Cal.; editorial comments. *B: P. M.* (2018)

Insect pests. (Journ. applied sci., July 1880, v. 11, p. 106, 5 cm.)

Notice of a proposal by E. Metschnikoff to use fungi in destroying noxious insects. *G: D.* (2019)

Joseph, Gustav. Vorläufige Mittheilungen über Innervation und Entwickelung der Spinnorgane der Insecten. (Zool. Anzeiger, 5 July 1880, jahrg. 3, p. 326–328.)

Contrary to the opinion expressed in T. W. Engelmann's "Zur Anatomie und Physiologie der Spinndrüsen der Seidenraupe" [Psyche, Rec., no. 1586] this author finds that nerve-branches go to the silk-glands from the suboesophageal ganglion and from the sympathetic nerve-system: development of the silk-glands. *G: D.* (2020)

K[ansas] u[niversity] scientific work. Recent operations. (Lawrence [Kans.] d. jour., 12 Nov. 1880, v. 11, no. 268, p. [4], col. 3, 19 cm.)

Notice of an expedition made to New Mexico by Prof. F. H. Snow, L. L. Dyche and Anna Mozley, in the summer of 1880; 12 new species of coleoptera obtained, one of them said by Dr. J: L. LeConte to be "the most extraordinary addition to our fauna that has been made for a long time." *B: P. M.* (2021)

Kapitel (Zum) der Varietätfabrikation. (Entom. Nachrichten, 1 July 1880, jahrg. 6, p. 145-146.)

Extract from an open letter to J. B. Géhin, published by A. Fauvel in his *Annuaire entomologique,* in which Fauvel opposes giving names to so many varieties of insects. *G: D.* (2022)

Kellicott, D: Simons. Larval habits of a golden-rod boring plume. (Can. entom., June 1880, v. 12, p. 105–106.)

Notes on a new species of *pterophoridae* which bores in *solidago.* *G: D.* (2023)

Kessler, Hermann Friedrich. Neue Beobachtungen und Entdeckungen an den auf *ulmus campestris* L. vorkommenden Aphiden-Arten. Mit 2 Tafeln Abbildungen. Separatabdruck aus dem 26 und 27 Jahresberichte des Vereins für Naturkunde zu Cassel. Cassel, T. Kay, 1880. t.-p. cover, t.-p., 34 p. 22.5×14, t 17.5×10.5; 2 pl., 26.5×22.5, t 22.5×17.5. pam., M 1.

Treats of and figures different stages of *tetraneura ulmi, t. alba,* and *schizoneura ulmi.* *G: D.* (2024)

Kingsley, J: Sterling. Notes on myriopods. (Amer. nat., Aug. 1880, v. 14, p. 594.)

Notes on several species from Williamstown, Mass. *G: D.* (2025)

Kunze, R: E. Rose-breasted grosbeak and Colorado potato beetle. (Amer. nat., July 1880, v. 14, p. 521–522.)

Hydemeles ludoviciana eats *doryphora decemlineata* readily; *cardinalis virginianus* eats *d. decemlineata* and *macrodactylus subspinosus.* *G: D.* (1026)

Lichtenstein, Jules. Les pucerons du térébinthe. (Feuille des jeunes naturalistes, May 1880, p. 85–88; June 1880, p. 97–99.)

Synopses of the galls and various forms of *pemphigus* found on *pistacia terebinthus;* biological notes. *G: D.* (2027)

Lancaster, E. Ray. The destruction of insect pests, an unforeseen application of the results of biological investigation. (Nature, 11 Mar. 1880, v. 21, p. 447–448.)

Criticism of H. A. Hagen's suggestion to employ yeast for the destruction of phylloxera, potato-beetle, cotton-worm, etc. [*see* Psyche, Rec., no. 1660]. *J. M. W.* (2028)

[**LeConte,** J: Lawrence.] List of coleoptera collected by *Dr.* R. Bell in 1879 on the Nelson and Churchill rivers. (Rept. of progress geol. surv. Can., 1878-1879, p. 65c-66c. Montreal, 1880. 8°.)

Nominal list of 38 species. *S: H. S.* (2029)

Libellenschwärme in Galizien. (Entom. Nachrichten, 15 June 1880, jahrg. 6, p. 133; 1 Aug. 1880, jahrg. 6, p. 167.)

Swarms of dragon-flies in northern Hungary. *G: D.* (2030)

Lichtenstein, Jules. Migrations of the aphides of the galls of the pistachio to the roots of grasses. (Annals and mag. nat. hist., Feb. 1879, s. 5, v. 2, p. 174.)

"The emigrants (second larval form) which quit the gall, fly to the grasses and there produce apterous young which are the budders (third larval form)." *R. H.* (2031)

Lichtenstein, Jules. Observations critiques sur les pucerons des ormeaux et les pucerons du térébinthe. (Feuille des jeunes naturalistes, Aug. 1880, p. 124–126.)

Corrections to the author's "Les pucerons des ormeaux . . ." (*l. c.,* Nov. 1879, p. 6–9; Dec. 1879, p. 22–24) [Psyche, Rec., no. 1615] and to his "Les pucerons du térébinthe," (*l. c.,* May 1880, p. 85–88; June 1880, p. 97–99) [Psyche, Rec., no. 2027]. Gives a corrected synopsis of the galls found on *ulmus.* *G: D.* (2032)

Lichtenstein, Jules, *see* Association française pour l'avancement des sciences — *Congrès de Montpellier, Section de zoologie.* [Abstract of proceedings] [Psyche, Rec., no. 1488].

Light of the glow-worm (The). (Frank Leslie's popular mo., May 1880, v. 9, p. 639, 2 cm.)

Conditions under which the light of *lampyridae* is produced. *G: D.* (2033)

Lyman, H: Herbert. List of diurnal lepidoptera taken in the vicinity of Portland, Maine. (Can. entom., Jan. 1880, v. 12, p. 7–9.)

Enumerates and gives notes on 46 species. *G: D.* (2034)

Mann, B: Pickman. Zoological subjects partly classified by the Dewey system. (Lib. journ., May 1880, v. 5, p. 143–144, 61 cm.)

A decimal classification of zoological subjects for the use of libraries in arranging their books. "The division has been carried, generally, only as far as the needs of an entomologist require, but a division of certain botanical subjects has been carried one step farther, since the relations of the subjects seemed to permit this to be done." *G: D.* (2035)

Marott, J. Pincitore. Émigrations et apparitions de certains lépidoptères; notes de mon agenda entomologique. (Feuille des jeunes naturalistes, July 1880, p. 115–117.)

Discussion of relative abundance and migrations of different lepidoptera about Palermo, Italy, and of accompanying peculiarities of the species. *G: D.* (2036)

Mocquerys, S. *and* **J. Bourgeois.** Tératologie entomologique. Recueil de coléoptères anormaux, par feu *M.* S. Mocquerys. Réimprimé par les soins de la Société des amis des sciences naturelles de Rouen, avec introduction par *M.* J. Bourgeois. Rouen, 1880. t.-p. cover, 16+142+[2] p., il. 23×14; 15×8.3. 3 fr. 50 c.

Rev., by G: Dimmock. (Psyche, Dec. 1880 [May 1881], v. 3, p. 150.)

Introduction [16 p.] in which the writer seeks to give, as far as possible, from memory of conversations with Mocquerys, the ideas of the latter upon abnormal forms of coleoptera, reviewing the causes and forms of general and special monstrosities. The monstrosities, most of which are from Mocquerys' collection, are each figured and described, being classified as follows: 1° Monstrosities by excess; 23 in the antennae, 4 in the palpi and mandibles, 3 (one a hybrid) in the elytra, 15 in the femora or tibiae, 10 in the tarsi or feet, 9 with extra gibbosities: 2° Monstrosities by deficient number of parts (9 examples): 3° Monstrosities without apparent causes (28 examples): 4° Incomplete development (11 examples). *G: D.* (2037)

Moggridge, J. Treherne. Observations on some orchids of the south of France. (Journ. Linn. soc., Bot., 3 Nov. 1864, v. 8, p. 256-258.)

Describes the pollination of several species by the aid of insects. *W: T.* (2038)

Molin, Rafael. Das Leben und die rationelle Zucht der Honigbiene. Mit 31 Holzschnitten. Wien, W. Braumüller, 1880. t.-p. cover, 16+212 p., 24×15, t 11×17. M 5.

General work on honey bees; their anatomy, care, diseases, enemies, etc. *G: D.* (2039)

Morris, G. K. A new harvesting ant. (Amer. nat., Sept. 1880, v. 14, p. 669-670.)

Some habits of a variety of *pheidole pennsylvanica* as observed in New Jersey. *G: D.* (2040)

Moseley, H. N. Further notes on the plants of Kerguelen, with some remarks on the insects. Journ. Linn. Soc., Bot., 4 Feb. 1875, v. 15, p. 53-54.)

Records the capture of "two apterous flies, one as large as a housefly, the other almost as big as a blowfly, an apterous gnat (*culex*) and a winged gnat, a small apterous (or rather very short-winged) moth, two or three beetles (*curculio* and *staphylinidae*), and three or four spiders (*saltici* and a *trombidium*)." *W: T.* (2041)

Müller, Fritz. Nectar-secreting glands. [Communicated by T: Belt.] (Nature, 14 June 1877, v. 16, p. 122, 20 cm.)

Shows the protective value of the nectar glands of *pteris aquilina* in Brazil. State that ants stroke nectar glands with their antennae as they do aphides, etc. *W: T.* (2042)

Müller, Fritz. On flowers and insects, &c. [Communicated by C: Darwin.] (Nature, 29 Nov. 1877, v. 17, p. 78-79, 40 cm.)

Describes the fertilization of several flowers by insects. States that the difference in neuration between the sexes of certain butterflies is connected with, if not caused by the development in the males of clusters of odoriferous scales. *W: T.* (2043)

Müller, Fritz. Nectar-secreting glands. [Communicated by Francis Darwin.] (Nature, 7 June 1877, v. 16, p. 100-101, 27 cm.)

Shows that in Brazil extrafloral nectar glands of *pteris* and other plants are visited by ants which protect the plants from the ravages of leaf-cutting ants. *W: T.* (2044)

Müller, Hermann. Die Befruchtung der Blumen durch Insekten und die gegenseitigen Anpassungen Beider. Ein Beitrag zur Erkenntniss des ursächlichen Zusammenhanges in der organischen Natur. Mit 52 Abbildungen in Holzschnitt. Leipzig, W. Engelmann, 1873. t.-p. cover, 8+478+[1] p., 23.5×16, t 19.5×12. Pap., M. 9.

Rev. by A. W. Bennett, entitled, "The fertilization of flowers by insects . . . ." (Academy, 15 Aug. 1873, v. 4, no. 78, p. 307-309, 59 cm.) (Amer. nat., Nov. 1873, v. 7, p. 680-683.)

Introduction, containing the history of the subject; insects which visit flowers and their adaptation to the flowers; flowers visited by insects and their adaptation to the insects, in order of families and species of plants; general review of the subject, its bearing on the theory of selection; peculiarities of flowers which cause insects to visit them; catalog of insects and of plants, serving as index. *G: D.* (2045)

Murray, A. S. Stephani on the antiquities of Mycenae. (Academy, 3 July 1880, p. 14-15.)

A discussion of the place of the butterfly (Psyche) in Greek art, based upon Stephani's paper in the Compte-rendu de la Commision impériale archéoligique [de St. Petersbourg] pour l'année 1877. *G: D.* (2046)

Neumoegen, Berthold. Description of a new genus and species of *zygaenidae*. (Can. entom., April 1880, v. 12, p. 67–69.)

Describes *edwardsia brillians* from Texas. *G: D.* (2047)

Newall, R. S. Carnivorous wasps. (Nature, 25 Mar. 1880, v. 21, p. 494.)

Carnivorous habits and ingenuity of wasps. *J. M. W.* (2048)

Noel, Paul. Chasses diverses aux coléoptères. (Feuille des jeunes naturalistes, May 1880, an. 10, p. 93.)

Abstract. (Psyche, July [12 Oct.] 1880, v. 3, p. 95. 7 cm.)

Easy way to collect *carabidae*, and another to collect *scarabaeidae* and *staphylinidae* which frequent dung. *G: D.* (2049)

Noel, Paul. Destruction des guêpiers. (Feuille des jeunes naturalistes, Oct. 1880, an. 10, p. 162.)

Uses a burning mixture of potassic chlorate [$KClO_3$] and sulphur [S] to destroy nests of *vespa*. *G: D.* (2050)

Nostrand, P. Elbert. Capture of a fine aberration of *chrysophanus americanus*. (Bull. Brooklyn ent. soc., May 1879, v. 2, p. 8.)

The underside of the right hind wing is marked by red dashes running from base to exterior margin. *F. G: S.* (2051)

Olney, E. W. Curious facts concerning ants. (St. Nicholas, May 1880, v. 7, p. 554–560. 249 cm., 5 il.)

Popular account of some of the most interesting habits of ants. *G: D.* (2052)

Origin and survival of the types of flowers (The). (Amer. nat., July 1880, v. 14, p. 517.)

A few notes on the modifying influences which insects have exerted on plants. *G: D.* (2053)

P., G. S. How to kill him. (New England homestead, 4 Sept. 1880, . . . 19 cm.)

Recommends carbolized paper for preventing ravages of *anthrenus scrophulariae*. *G: D.* (2054)

Packard, Alpheus Spring, *jr.* Case of protective mimicry in a moth. (Amer. nat., Aug. 1880, v. 14, p. 600.)

Mimicry of *polistes fuscus* by *trochilium polistiformis*. *G: D.* (2055)

Pea weevils. ("N. Y. herald, ...") (Florida agriculturist [DeLand, Fla.], 16 Feb. 1881, no. 144, v. 3, no. 40, p. 316, col. 3, 11 cm.)

Enclosing peas or beans in a tight vessel containing an open bottle of turpentine, and occasionally exposing the vessel to the heat of the sun, kills the eggs deposited in the seeds. *B: P. M.* (2056)

Petroleum for scale insect. ("Pacific rural press," . . . .) (Florida agriculturist [DeLand, Fla.], 16 Feb. 1881, no. 144, v. 3, no. 40, p. 318, col. 4, 22 cm.)

Successful use of crude petroleum in killing bark-lice. *B: P. M.* (2057)

Philadelphia silk school (The). ("Philadelphia ledger. . . .") (Journ. applied sci., Oct. 1880, v. 11, p. 155-156, 29 cm.)

Establishment of a school, by the Women's silk culture association, in which to learn how to rear silkworms and reel silk. *G: D.* (2058)

Popenoe, Edwin Alonzo. A new insect foe. (The industrialist [Manhattan, Kans.], 29 May 1880, v. 5, suppl., no. 59, p. [2], col. 3-4, 35 cm.)

Description of *aramigus tessellatus*, which devours leaves of sweet potatoes (*ipomoea*), but is found mostly on a species of *psoralea;* its habits are those of *a. fulleri.* *B: P. M.* (2059)

Popenoe, Edwin Alonzo. The web worm. Notes upon its habits, and description of its transformations. (2nd quart. rept. Kansas state board agric. for 1880, [20 July] 1880, p. 99-103.)

Description of larva, pupa and imago, habits and ravages of *eurycreon rantalis;* its food plants; checks upon its increase. *B: P. M.* (2060)

Preisausschreiben. (Entom. Nachrichten, 1 July 1880, jahrg. 6, p. 147.)

Announcement of prizes for papers upon injurious insects offered by Miss E. A. Ormerod, through the Entomological Society of London. *G: D.* (2061)

Prentiss, Albert N. Destruction of obnoxious insects by means of fungoid growths. (Amer. nat., Aug. 1880, v. 14, p. 575-581; Sept. 1880, v. 14, p. 630-635.)

In a series of experiments the author finds "that yeast cannot be regarded as a reliable remedy against such insects as commonly affect plants cultivated in green-houses, rooms and parlors." Compare H. A. Hagen's "Obnoxious pests . . . " [Psyche, Rec., no. 1659.] *G: D.* (2062)

R., M. H. Kerosene vs. lice. ("Country gent., ...") (Florida agriculturist [DeLand, Fla.], 16 Feb. 1881, no. 144, v. 3, no. 40, p. 318, col. 4-5, 13 cm.)

Successful use of kerosene in killing or preventing lice on fowls. *B: P. M.* (2063)

Rogers, R. Vashon. Entomology for beginners. *Clytus.* (Can. entom., Aug. 1880, v. 12, p. 148-152, fig. 21.)

Figures *c. speciosus;* habits and description of *c. speciosus*, *c. pictus* and *c. robiniae.* *G: D.* (2064)

Royal geographical society. (Colonies and India, 27 Nov. 1880, p. 11-12, 51 cm.)

Contains notes upon the disappearance of the tsetse-fly [*glossina morsitans*] before the advance of civilization in Africa. *G: D.* (2065)

Ryder, J: A. Holman's new compressorium and moist chamber. (Amer. nat., Sept. 1880, v. 14, p. 691-693.)

Use of this compressorium for studying the larva of *corethra plumicornis.* *G: D.* (2066)

Ryder, J: A. Phosphorescence of very young fishes. (Amer. nat., Sept. 1880, v. 14, p. 675-676.)

The author says, "there seems to me to be little doubt that the prime element in the production of phosphorescence in the animal world in general, is some kind of sudden molecular disturbance or impulse, disturbing the equilibrium of the molecules of the living protoplasm involved, so as to produce a kind of motion which makes itself apparent as momentary emissions of light. I have no doubt that the phenomenon in *Lampyris* or the fire-fly, is connected with expiration and inspiration." . . . *G: D.* (2067)

Torrey, Bradford. Second flight of dragon-flies. (Amer. nat., Aug. 1880, v. 14, p. 594.)

Records flight of dragon-flies in Melrose [Mass.]. *G: D.* (2068)

CORRECTIONS.

The passages indicated should read as follows: —

p.	col.	l.	
65	1	8	. . . genus, which . . .
65	2	—9	*caciella*, but . . .
66	1	7	. . . rolled into cones
88	1	—8	. . . where the transformations of the larvae could . . .
99	2	2	. . . shown in fig. 4, and . . .
123	2	4	. . . hairs pointing . . .
123	2	5	. . . segment 2, subquadrate,
123	2	—5	horns and spurs . . .
124	1	2	. . . the spurs along . . .
124	1	11	. . . now four spurs, the
124	1	—13	body stouter in . . .
124	1	—1	side below horns . . .
124	2	—12	. . . under side paler; . . .
125	1	1	. . . and one on . . .
125	1	6	. . . anterior edge of . . .
125	2	6	. . . the four stripes . . .
125	2	8	with four paler stripes.
126	2	5	go, some died, and
126	2	9	. . . with separated yellow tu-
126	2	20	are all longer, . . .
127	1	2	. . . is a little round
127	1	5	. . . on middle of dor-

p.	col.	l.	
8	1	—15	. . . der Insekten. . . .
10	2	3	Abstract, entitled, "A new oil-producing insect." . . .
10	2	—31	. . . 1879, p. 12, 4 cm.)
11	2	—13	*Acanthocinus nodosus*, . . .
13			*Insert* REVIEWS . . . 19
21	2	1	. . . **K.**, I. D. . . .
21	2	—16	**Turner**, H: Ward. . . .
22	1	11	. . . entom. Belg., . . .
25		—9	. . . Annual Address . . .
46	1	3	. . . 1879, v. 41, p. 325, . . .
46	1	11	(Feuille des . . .
47	1	—25	. . . and *Pterotus* LeC.
47	1	—24	ABRASSIN OIL . . .
47	1	—16	. . . v. 1, p. 765.
56	1	—23	**Dezsŏ**, Béla. Ueber . . .
57	1	21	. . . bd. 36, abth. 2, p. 273-
58	1	3	. . . 15 Dec. 1879, . . .
58	1	7	. . . nomina entomologorum . . .
58	1	—14	. . . (Feuille des . . .
58	2	13	**Smith**, *Miss* Emily Adella.
59	1	8	. . . Doria, Beccari, et . . .
70	1	6	halictes. . . .
70	2	1	**Müller**, Fritz. . . .
78	2	8	9 + 15 + p., . . .
78	2	17	. . . (La emula-
79	1	9	. . . Mün-
83	1	4	. . . the Entomological
83	1	—21	. . . 17 Feb. 1680,
89	1	—26	among a number . . .
91	1	26	(Archiv f. . . .
93	1	18	. . . [*Trochilium denudatum* de-
94	2	1	**Turner**, H: Ward. . . .
94	2	17	. . . v. 22, pt. 2, p. 32-34.)
106	2	—22	. . . collecting *silphidae*, *ela-*
116	2	—18	. . . April 1880, . . .
128	1	17	Rec., no. 1942] . . .
128	2	—14	. . . a work of such
129	2	16	[**Bed bugs** . . .
130	2	1	[**Horváth**, Géza. . . .
139	1	27	v. 1, p. 70, col. 2, 3 cm.)
142	2	—12	. . . (Feuille

8	2	8	. . . (Diptera) [PSYCHE, Rec., no. 1458].
9	1	—1	. . . Dipteren" [PSYCHE, Rec., no. 1452].
10	2	21	. . . Yucatan [PSYCHE, Rec., no. 1479].
21	2	—17	. . . French [PSYCHE, Rec., no. 1593].
22	1	18	. . . de l'Académie . . .
46	2	—28	entitled, . . .
40	2	—27	. . . 373-374) [PSYCHE, . . .
55	2	—11	. . . on *liriodendron* . . .
58	2	—5	Defence of . . .
57	2	20	SMITH, *Miss* Emily Adella.
70	1	—12	optera injurious . . .
78	2	—7	. . . name, the others . . .
78	2	—4	. . . to remain over . . .
82	1	—9	. . . *mylitta* (= *antheraea* . . .
90	2	9	. . . *melipotis stygialis*, . . .
91	1	—25	. . . favorable opportunities
92	1	17	no. 1785].
92	1	—12, —11, —5	and *thyridia* . . . | cussion of . . . | with a view . . .
116	2	—26	. . . known." Mentions . . .
129	1	—26	24-31 Aug. 1880. . . .
129	1	—19	. . . E: S. Holden, . . .
129	1	—16	who died during year; . . .
129	2	—13	. . . Rec., no. 1926].
130	2	—24	*nana* and varieties, *Phthoroblastis* . . .
130	2	—2	*strike out* those being the ones
139	1	15	Beider . . ." [PSYCHE, Rec., no. 2045].

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ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

[Established in 1874.]

EDITED BY

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Vol. 3. No. 81.

JANUARY, 1881.

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PSYCHE.

ON THE NUMBER OF MOLTS OF BUTTERFLIES, WITH SOME HISTORY OF THE MOTH *CALLOSAMIA PROMETHEA*.

BY WILLIAM H: EDWARDS, COALBURGH, W. VA.

WHEN I first began to study the history of the lepidoptera, it was difficult to learn from any quarter how many molts lepidopterous larvae underwent. No one to whom I could apply could tell with any assurance of certainty what was the number of molts among the butterflies, and authors either disagreed or were silent on the subject. Burmeister (Lond. ed., 1836, page 431) says: "The caterpillars of the butterflies molt, according to Kirby and Spence, *frequently; but thrice*, according to Cuvier. The caterpillars of the *noctuae*, *on the contrary*, *molt four times*," etc.

Boisduval (Spec. Gen., v. 1, p. 46) says: "These molts are more or less numerous according to the family; the *rhopalocera* passing *ordinarily three and four;* the greater part of the *heterocera* four, except some clothed species, which pass from seven to eight."

Kirby and Spence (Introd. to Ent., Lond. ed., 1856, p. 36) speak of "butterfly caterpillars throwing off three or more successive skins."

Westwood (Brit. Butt., v. 1, p. 6) says: 'They cast their skins several times."

Harris (Ins. injur. veg., ed. 1862, p. 259) says: "Caterpillars usually change their skins about four times," referring to caterpillars generally.

So it will appear that, twenty years ago, no definite information was to be had on the subject. It was the custom when larvae were described, if any mention of stages earlier than the last, or mature, was made, to say, "young larva," "half grown," etc., with no reference to the number of molts.

During these years, and indeed since 1870, I have bred from the egg many species of butterflies, as PAPILIOS 6, viz., *ajax*, *philenor*, *asterias*, *troilus*, *turnus*, *cresphontes;* PIERIS 3, *protodice*, *oleracea*, *rapae;* COLIAS 2, *eurytheme*, *philodice;* TERIAS 1, *nicippe;* DANAIS 1, *archippus;* ARGYNNIS 7, *diana*, *idalia*, *cybele*, *aphrodite*, *egleis*, *myrina*, *bellona;* EUPTOIETA 1, *claudia;* MELITAEA 1, *phaeton;* PHYCIODES 3, *harrisii*, *nycteis*, *tharos;* GRAPTA 3, *interrogationis*, *comma*, *progne;* VANESSA 1, *antiopa;* PYRAMEIS 2, *atalanta*, *huntera;* LIMENITIS 2, *arthemis*, *disippus;* APATURA 2, *celtis*, *clyton;* NEONYMPHA 4, *eurytris*, *sosybius*, *gemma*, *canthus;* DEBIS 1, *portlandia;* SATYRUS 1, *alope;* LIBYTHEA 1, *bachmanni;*

Chrysophanus 1, *americana;* Lycaena 2, *pseudargiolus*, *comyntas;* Pamphila 4, *hobomok*, *huron*, *verna*, *cernes;* Eudamus 3, *bathyllus*, *lycidas*, *tityrus;* Pholisora 1, *catullus:* 53 species, all but one or two to imago, and these through the larval stages to chrysalis. Several others I have received in either first or second larval stages from correspondents, and have carried the larvae to imago, as Papilio 1, *palamedes;* Callidryas 1, *eubule;* Heliconia 1, *charitonia;* Agraulis 1, *vanillae;* Eresia 1, *texana;* Limenitis 1, *eros;* Apatura 2, *alicia*, *flora:* making 8 species. Besides this, Messrs. Couper, Baron, Mead, and other correspondents have bred other species, of which I have had reports, as *Papilio brevicauda* and *machaon* (the latter determined at my special request by Dr. Aug. Weismann and Mr. Wm. Buckler) *Pieris beckeri* and *sisymbri*, *Anthocharis stella*, *Danais berenice*, *Melitaea rubicunda* and *chalcedon*, *Grapta satyrus*, *Pamphila ethlius*, 10 species, thus making 71 species whose complete larval history has been observed. It is difficult to follow the stages of the Hesperians, as the larvae conceal themselves in cases of leaves, but so far as I have been able to do so, the molts in each case have been four. In *Eudamus lycidas* and *Pholisora catullus* I made sure of this the past season. About *Callidryas eubule* I am in doubt, that is, whether there are three or four molts. The early stages so much resemble each other in this species and pass so rapidly, that I could not be sure at which stage I received the larvae from Georgia. Mr. Baron reported three molts to both *Pieris beckeri* and *P. sisymbri*, and gave dates of their occurrence. There certainly were three only to *Neonympha gemma*, verified by me in several broods. But in all other cases there have been four, except when the larvae hibernated, and then an additional molt occurred. There seems to be a necessity with the hibernators of getting rid of the rigid skin in which the larva has passed the winter; that is, if the hibernation has taken place during the middle stages, as it does in *Apatura* and *Limenitis*. In these cases very little food is taken between the molt which precedes hibernation and the one which follows it, and the larva while in lethargy is actually smaller than before the next previous molt. The skin shrinks, and has to be cast off before the awakened larva can grow. These species (observed), whose larvae molt five times in the winter brood, require but four molts during the summer. In the case of *Limenitis disippus* the stages up to the third molt are identical in the winter and summer broods, but the stage following the third in summer is equivalent to the two stages after the third in winter, and the stage after the fourth of the one comes to be identical with the stage after the fifth of the other. Many larvae go into lethargy immediately after exclusion from the egg, as the large Argynnids, and probably all the Satyrids of the *alope* group.* The former pass five molts, but probably only four in summer.

---

* I have now hibernating young larvae of *Satyrus silvestris*, eggs of which species were received from Mr. Baron and hatched here at Coalburgh. They look like and behave exactly as *alope*.

At any rate the small Argynnids, as *myrina* and *bellona*, pass but four in summer. *Satyrus alope* passes but four, although the only brood of the year is that of winter. In both these genera, the larvae eat nothing before lethargy, except their own egg shell, but feed for several days after awaking and before a molt comes on.

The genera above mentioned, on which observations have been made, embrace a large proportion of those which belong to the North American butterfly fauna, and we may infer that butterflies of the other genera, at least those which inhabit temperate regions, will as a rule be found to behave likewise, and that the regular number of molts is four, except in cases of hibernation, three being a very rare exception.

In the Entomologists' Monthly Magazine for July 1880, Mr. Wm. Buckler, who has had very great experience in breeding lepidopterous larvae, contributes a paper entitled: "Is the number of moults of lepidopterous larvae constant in the same species?" and begins thus: "I have been impressed lately with the uncertainty that seems to exist as to the number of times lepidopterous larvae moult in course of their growth, and have been considering whence this uncertainty springs. . . . Or is it quite certain, as many think, that the number of moults varies in the same species? . . . I know that the number of moults certainly varies in different species. I have myself made sure that six is the number for some and nine for others, as in the case *Nola centonalis*. . . . Any one who has made notes on which he can depend about the growth of any species he has reared, would I think do good service by publishing them," etc.

What I have said before will in some respects answer Mr. Buckler's query, so far as concerns North American butterflies at least. I have no doubt the several species are constant in the number of their molts, the exceptional cases being as I have stated.

But whether the same can be said of all species of *heterocera* I am not competent to say. Certain observations made on *Callosamia promethea* would seem to indicate that there may be variability.

I happened last spring to have a cocoon of this silk-worm moth, which I had brought in from a tulip tree, and as a female came from it, it occurred to me to see how many molts its larvae might have. I have long given up breeding or collecting *heterocera* (though for several years I bred *sphinges* and *bombycidae* largely), the North American Diurnals giving me more work than I can properly attend to; but I had some curiosity to satisfy in this particular case. I tied the subject to a tree, and during the night it was impregnated, and next day, 19 April, it laid many eggs. The hatching began 1 May. The first molt took place 7 May; second molt, 11 May; third molt, 15 May. On 22 May, or 7 days after third molt, the first larva was shut up in its cocoon. I was much surprised at this, as I had expected four molts, and I searched the books to see what had been said about this species. (*To be continued on p. 171.*)

PSYCHE.

CAMBRIDGE, MASS., JAN. 1881.

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PROCEEDINGS OF SOCIETIES.

Cambridge Entomological Club.

12 Nov. 1880. — 71st meeting. The following persons were elected to membership: W: Barnes, of Decatur, Ill.; J: A. Ryder, of Philadelphia, Pa.; S: Wendell Williston, of New Haven, Conn.; *Miss* Emily Adella Smith, of Peoria, Ill.; Gustav Thommen, of Lowell, Mass. . . . Dr. E: L. Mark exhibited some drawings which he had made, illustrative of the external anatomy of the head and thorax of a larva allied to *Lithocolletis*, which he had found mining in the leaves of *Acer*. The special point of interest to which Dr. Mark called attention in connection with these drawings was the indication of the existence of organs performing the function of prop-legs, on the back of the thoracic rings. Dr. Mark was not aware that such organs had been noticed in lepidopterous larvae. He referred to the discovery of abdominal legs in the embryos of *Hydrophilus*, *Mantissa* and *Campodea*, by different observers. . . . Notice was taken of the death of Jacob Boll, of Dallas, Texas. . . . Mr. W: Trelease said he had taken individuals of the genus *Apathus* on flowers of *Tigridia*, engaged in supplying themselves with food. Mr. S: Henshaw said he also had taken a few of these bees on flowers. . . . Mr. Roland Hayward exhibited a specimen of *Calosoma wilcoxii*, taken at Nantucket, Mass. Mr. S: Henshaw said that he had recorded about half a dozen captures of this species in eastern Massachusetts. . . . Mr. W: Barnes said he had captured several specimens of *Anthocharis olympia* and of *Terias nicippe* in Central Illinois. This region is the meeting place of the southern and northern faunae. The limits of the faunae come within fifty kilometres of each other, and are not indicated by any geographical feature. Mr. Barnes said he had found *Papilio cresphontes* feeding on the hop tree (*Ptelea trifoliata*). . . . Mr. W: Trelease said he had found *Harpalus caliginosus* feeding on the ripening seeds of the rag-weed (*Ambrosia artemisiaefolia*). Mr. Roland Hayward said he had found *H. pennsylvanicus*, *H. compar* and *H. faunus* on the same plant. Mr. E: P. Austin said he had found several species of *carabidae* feeding on plants, some of them eating the leaves. . . . Mr. W: Trelease said that the young leaves of poplar trees (*Populus*) had nectar glands on the petioles, to which he had found ants and parasitic hymenoptera attracted for the sake of feeding on the nectar. In a grove of Japanese persimmon trees (*Diospyros*) in the grounds of the Department of Agriculture at Washington, the leaves had been distorted by a homopterous insect which produced honey-dew upon them, and he had seen numerous honey-bees visiting these leaves to obtain the honey-dew. He had also seen humming bees (*Bombus*) feeding on carrion. He had found *Vespa maculata* cutting holes 3 mm. in diameter in the flowers of *Ribes cynosbati;* he had also found ants cutting holes in a similar manner in these flowers, and perforating the corolla of *Salvia splendens* near the mouth of the calyx. Prof. J: H: Comstock had found a fungus ("*Scorius spongiosus*") growing on the honey-dew produced by woolly plant-lice [*Eriosoma?*]. Fungus had also been found on the honey-dew produced by *coccidae* on the orange tree (*Citrus*).

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [ ], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

A colon after initial designates the most common given name, as: A: Augustus; B: Benjamin; C: Charles; D: David; E: Edward; F: Frederic; G: George; H: Henry; I: Isaac; J: John; K: Karl; L: Louis; M: Mark; N: Nicholas; O: Otto; P: Peter; R: Richard; S: Samuel; T: Thomas; W: William. The initials at the end of each record, or note, are those of the recorder.

Corrections of errors and notices of omissions are solicited.

[**American association for the advancement of science.** 23rd meeting, Hartford, Conn., 12-19 Aug. 1874.] (Amer. nat., Sep. 1874, v. 8, p. 569-574.)

Notice of formation of the Entomological club of the A. A. A. S.; contains a list of papers read in section B, including about 12 entomological titles. *B: P. M.* (2069)

American association for the advancement of science. [24th meeting, Detroit, Mich., 11-17 Aug. 1875.] (Amer. nat., Sep. 1875, v. 9, p. 524-527.)

Notice of meeting and of S: H. Scudder's Fossil butterflies [Rec., 591]. *B: P. M.* (2070)

American association for the advancement of science. [25th meeting, Buffalo, N.Y., 23-30 Aug. 1876.] (Amer. nat., Oct. 1876, v. 10, p. 636-640.)

Contains a list of papers read in section B, including 3 entomological titles. *B: P. M.* (2071)

American association for the advancement of science. [26th meeting, Nashville, Tenn., 29 Aug.-4 Sep. 1877.] (Amer. nat., Oct. 1877, v. 11, p. 636-639.)

Contains a list of papers read in section B, including 3 entomological titles. *B: P. M.* (2072)

American association for the advancement of science. [27th meeting, St. Louis, Mo., 21-28 Aug. 1878.] (Amer. nat., 1878, v. 12, Oct., p. 706; Nov., p. 769.)

Notes of meeting, with list of some papers read in section B, including none on entomology. *B: P. M.* (2073)

American association for the advancement of science. 28th meeting, Saratoga [N. Y.], Aug. 27 to Sept. 2, 1879. (Amer. nat., Oct. 1879, v. 13, p. 664-665.)

Contains a list of papers read in section B, including about 6 entomological titles. *R. Th.* (2074)

American association for the advancement of science. 29th meeting, Boston [Mass.], Aug. 25 to Sept. 1, 1880. (Amer. nat., Oct. 1880, v. 14, p. 757-760.)

Contains a list of papers read in section B, including about 30 entomological titles. *G: D.* (2075)

Appointment of state entomologist for New York. (Can. entom., Aug. 1880, v. 12, p. 160.)

Appointment of Joseph Albert Lintner, of Albany, N. Y. *G: D.* (2076)

Ashmead, W: Harris. The orange root borer. (Florida agriculturist [DeLand, Fla.], 16 Feb. 1881, no. 144, v. 3, no. 40, p. 316, col. 2-3, 34 cm., fig.)

Account and figure of a cerambycid larva, perhaps *prionus pocularis*, which consumes the interior of the roots of orange trees [*citrus*]. *B: P. M.* (2077)

Balbiani, E. G. Remarques relatives à une communication de M. Boiteau, sur la présence d'œufs d'hiver du phylloxera dans les couches superficielles du sol. (Comptes rendus, 17 Nov. 1879, v. 89, p. 846-847.)

Reply, by Boiteau, entitled "Réponse à M. Balbiani, au sujet de la présence de l'œuf d'hiver du phylloxera dans le sol." (Comptes rendus, 15 Dec. 1879, v. 89, p. 1027-1028.)

Crit. rev. of Boiteau's "Sur la présence, dans les couches . . . , d'œufs . . ." (Comptes rendus, 10 Nov. 1879, v. 89, p. 772-774) [Rec., 2083]. *G: D.* (2078)

Baly, Joseph S. Descriptions of new genera and species of *galerucinae*. (Annals and mag. nat. hist., Jan. 1879, s. 5, v. 3, p. 73.)

Cont. from v. 2, p. 422. Describes *diabrotica nigripes*, *d. fulvosignata* and *d. sexmaculata* from Guatemala and *d. interruptofasciata* and *d. insignata* from Mexico. *R. H.* (2079)

Barber, *Mrs.* M. E. On the fertilization and dissemination of *duvernoia adhatodoides.* (Journ. Linn. soc., Bot., 15 Apr. 1869, v. 11, p. 469-472.)

Describes and figures the actions of a *xylocopa* when visiting the flowers of this African plant. *W: T.* (2080)

Batelli, *Dr.*—. On the anatomy of *eristalis tenax.* (Annals and mag. nat. hist., Jan. 1879, s. 5, v. 3, p. 94.)

The external tube of the tail is regarded as a modified segment of the body. *R. H.* (2081)

Behr, H. The phylloxera and its foes. (Pacific rural press [San Francisco], 31 July 1880, v. 20, p. 66, col. 1-3, 88 cm.)

Lecture delivered at the July meeting of the State viticultural commission, at Sonoma, Cal., 23 July 1880; biography of the phylloxera; enumeration of its foes. *B: P. M.* (2082)

Boiteau, ——. Sur la présence, dans les couches superficielles du sol, d'œufs d'hiver du phylloxera fécondés. (Comptes rendus, 10 Nov. 1879, v. 89, p. 772-774.)

Crit. rev., by E. G. Balbiani, entitled, "Remarques relatives á une communication de M. Boiteau, sur la présence d'œufs d'hiver du phylloxera dans les couches superficielles du sol." (Comptes rendus, 17 Nov. 1879, v. 89, p. 846-847.)

Notice. (Rev. scientifique, 22 Nov. 1879, p. 500, 5 cm.) *G: D.* (2083)

Boiteau, ——. Réponse à M. Balbiani, au sujet de la présence de l'œuf d'hiver du phylloxera dans le sol. (Comptes rendus, 15 Dec. 1879, v. 89, p. 1027-1028.)

Reply to E. G. Balbiani's "Remarques relative á une communication . . ." (Comptes rendus, 17 Nov. 1879, v. 89, p. 846-847) [Rec., 2078] *G: D.* (2084)

Boll, Jacob, *see* B., J. H., Memoir of the late Professor Jacob Boll [Rec., 1926].

Bourgeois, J., *see* MOCQUERYS, S. *and* J. BOURGEOIS, Tératologie entomologique . . . [Rec., 2037].

Bowles, G: H., *see* ENTOMOLOGICAL SOCIETY OF ONTARIO— *Montreal branch.* 7th annual report . . . [Rec., 2093].

Bowles, G: J:, *see* ENTOMOLOGICAL SOCIETY OF ONTARIO — *Montreal branch.* 7th annual report . . . [Rec., 2093].

Bridge-building ant (A). ("Leisure hour.") (Colonies and India, 11 Dec. 1880, p. 14, 9 cm.)

How the driver-ants [*anomma arcens*] of Africa, cross streams. *G: D.* (2085)

Bridgman, J: B. Bees and flowers. Nature, 6 Dec. 1877, v. 17, p. 102, 6 cm.)

States that *andrena hattorfiana* is found only on the flowers of *scabiosa; colletes succincta,* only on those of *erica.* The writer finds that bees collect the pollen of several species of flowers on a single visit. *W: T.* (2086)

Brongniart, C: *and* Max **Cornu**. Epidémie causée sur des diptères du genre *syrphus* par un champignon *entomophthora.* (Comptes rendus, 9 Feb. 1880, v. 90, p. 249.)

The note, with above title, sent to the Académie des sciences, and referred to their Commission on the phylloxera, is not printed in the *Comptes rendus,* but the remarks of the Permanent Secretary [Jean Baptiste Dumas] in regard to the application of fungi to the destruction of insects are printed (*l. c.* p. 249-251). Quotes an abstract of H. A. Hagen's "Destruction of obnoxious insects" [Rec., 1660] given in a communication by H. Donckier de Donceel to the Bull. soc. entom. Belg. *G: D.* (2087)

Canker worms. (Springfield [Mass.] sunday telegram, 9 Nov. 1873, . . . 15 cm.)

Mode of protecting trees with printers' ink. Extracted from *Mass. ploughman.* *G: D.* (2088)

Cornu, Max, see BRONGNIART, C: *and* Max CORNU, Epidémie causée sur des diptères . . . [Rec., 2087].

Crüger, H. A few notes on the fecundation of orchids and their morphology. (Journ. Linn. soc., Bot., 3 Mar. 1864, v. 8, p. 127-135, pl. 9.)

Considers the efficiency of insects in fertilizing several Trinidad orchids. *W: T.* (2089)

Darwin, Francis. On the nectar-glands of the common brake fern (*pteris aquilina*). (Journ. Linn. soc., Bot., 1 June 1876, v. 15, p. 407-408.)

States that the glands attract several species of ants, especially *myrmica;* also *elater* and another beetle. *W: T.* (2090)

Decaux,——. Destruction des *acarus.* (Feuille des jeunes naturalistes, March 1880, an. 10, p. 66-67.)

Uses carbon disulphide [C S2] to kill *acarus.* *G: D.* (2091)

Destroying grain weevils. (Science news, 1 Aug. 1879, v. 1, p. 304.)

"Riley recommends the use of bisulphide of carbon [C S2]." *S: H.* (2092)

Entomological society of Ontario—*Montreal branch.* 7th annual report of the council. (Can. entom., Aug. 1880, v. 12, p. 146-147.)

Report rendered by G: J: Bowles, *president,* and G: H. Bowles, *secretary.* List of papers read and of additions to library. *G: D.* (2093)

Erhaltung (Die) der flüchtigen Farben der Libellen. (Entom. Nachrichten, 1 July 1880, jahrg. 6, p. 145.)

Abstract of P. Stefanelli's "2nda memoria intorno alla conservazione delle libellule a colori fugaci" (Bull. soc. entom. ital., 1879, an. 11, p. 29-36) [Rec., 2124]. *G: D.* (2094)

Ernst, A. La enfermedad del malojo en las vegas del Guaire. (La opinion nacional [Carácas, Venezuela], 20 Apr. 1880, año 13, no. 3262, p. 2-3, 65 cm.)

Green corn fodder crops in the plains (*vegas*) of La Guayra attacked by an insect, here described, named provisionally *miris maidis* or *chinche del maiz*, which sucks the leaves and kills the plants. *B: P. M.* (2095)

Ernst, A. La epizootia de las moscas. (La opinion nacional [Carácas, Venezuela], 15 July 1880, año 13, no. 3331, p. [1], col. 4-5, 55 cm.)

Destruction of flies by *empusa muscae;* description of the parasite. *B: P. M.* (2096)

Fernald, C: H: Oviposition in the *tortricidae*. (Amer. nat., Jan. 1881, v. 15, p. 63-65.)

Separate, [Phil., 1881], p. 63-65, 23×15, t 18×10.2.

Description of eggs and larvae, habits and oviposition of *tortrix fumiferana*, which is very destructive to leaves of *abies balsamea*. *B: P. M.* (2097)

[**Fitch** (Asa), The entomological collection of.] (Amer. naturalist, March 1880, v. 14, p. 228-229.)

Enumeration of the contents of this collection, comprising 106 boxes arranged, 125000 duplicates, 148 note books, and other material. *B: P. M.* (2098)

Forbes, Stephen Alfred. The food of the darters. (Amer. nat., Oct. 1880, v. 14, p. 697-703.)

Food of the *etheostomatinae*. Tabulation of the proportion of food which different groups of animals furnish to these fishes, which devour, among other insects, *corixa*, *palingenia*, *ephemeridae*, larvae of *phryganidae* and of *chironomus*, and pupae of *agrionina* and of *chironomus*. *G: D.* (2099)

[**Geffcken**, Woldemar?] List of lepidoptera from the Nelson and Churchill rivers and the west coast of Hudson's bay. (Rept. of progress geol. surv. Can., 1878-1879, p. 63c-64c. Montreal, 1880. 8°.)

Nominal list of 25 butterflies and 4 moths. *S: H. S.* 2100)

Godman, F. Du Cane *and* Osbert **Salvin**. Descriptions of new species of *rhopalocera* from Central and South America. (Annals and mag. nat. hist., Sep. 1878, s. 5, v. 2, p. 257.)

Describes *callithomia panamensis*, *ithomia aesion*, *i. jucunda*, *i. caedia*, *i. rhene* and *tithorea pinthias* from Panama; *phyciodes poltis* from Mexico; *ph. fulgora*, *ph. sosis*, *ph. cassiopea* and *adelpha sophax* from Costa Rica; together with many South American species. *R. H.* (2101)

Hagen, Hermann August. [Bibliotheca entomologica.] (Harvard register, April 1880, v. 1, p. 85, col. 2, 3 cm.)

Notice that Dr. Hagen leaves the continuation of this work to younger hands. *G: D.* (2102)

Hance, H: F. On the silkworm oaks of northern China. (Journ. Linn. soc., Bot., 7 May 1868, v. 10, p. 482-492.)

Considers the rearing of "mountain silk" worms, and the plants which furnish their food. *W: T.* (2103)

Houlbert,——. Phosphorescence d'une scolopendre. (Feuille des jeunes naturalistes, Nov. 1879, p. 14.)

Phosphoresence of a French species of *scolopendra*. *G: D.* (2104)

Humbert, Alois, *see* Scudder, S: Hubbard, Les premiers types d'insectes . . . [Rec., 2122].

Joly, Emile, *see* Joly, Nicolas *and* Émile Joly, Études sur le prétendu crustacé . . . (Rec., 2107].

Joly, Émile. Note sur le prétendu crustacé dont Latreille a fait le genre *prosopistoma*. (Mém. soc. nation. des sci. nat. de Cherbourg, 1872, v. 16, s. 2, v. 6, p. 329-336.)

Considers *prosopistoma* an ephemerid. *S: H.* (2105)

Joly, Émile. Sur un nouvel cas de jeûne prolongé chez le *prosopistoma punctifrons*. (Annal. soc. entom. France, v. 8, trim. 2, Bull., p. 59-60.) *Zool. Anz.* (2106)

Joly, Nicolas *and* Émile **Joly**. Études sur le prétendu crustacé au sujet duquel Latreille a créé le genre *prosopistoma* et qui n'est autre chose qu'un véritable insecte hexapode. (Ann. des sci. nat., 1872, s. 5, v. 16, p. 1-16, pl. 13.)

General remarks; external structure, insect characteristics, habits; résumé and conclusions; figures anatomy. *S: H.* (2107)

Kansas state board of agriculture, *Topeka, Kans.* Quarterly report for the quarter ending June 30, 1880. [2d quarterly report for 1880.] . . . J. K. Hudson, secretary. . . . Topeka, [20 July] 1880, t.-p. cover+119 p. 23×15.

Contains, p. 22-37, 40-56, detached statements of the prevalence of insects upon the various crops throughout the state, and recommending to cut out borers from fruit trees as the only means against them; recommends hand picking of rose chafers [*macrodactylus*], p. 61; chinch bugs [*blissus leucopterus*] injure sorghum cane; contains also the following article:—

Popenoe, E. A. The web worm. . . . [Rec., 2060].
B: P. M. (2108)

Lintner, Joseph Albert, *see* Appointment of state entomologist . . . [Rec., 2076].

[**Lintner**, Joseph Albert, appointed state entomologist of New York.] (Psyche, June [13 Aug.] 1880, v. 3, p. 83.) (Amer. nat., Sep. 1880, v. 14, p. 696.)

Announcement and commendation. *B: P. M.* (2109)

Lintner, Joseph Albert. The clover-seed fly, a new insect pest. (Amer. nat., March 1879, v. 13, p. 190.)

Brief account of and reference to description of larva of *cecidomyia trifolii* n. sp., which destroys seeds of *trifolium pratense.* *G: D.* (2110)

Meldola, Raphael. Butterflies with dissimilar sexes. (Nature, 24 April 1879, v. 19, p. 586-588, 62 cm.)

An extended review of S: H. Scudder's "Antigeny, or sexual dimorphism in butterflies" (Proc. Amer. acad. arts and sci., 1877, v. 12, p. 150-158) [Rec. 2121) *G: D.* (2111)

Mouillefert, ——. Sur les résultats fournis par le traitement des vignes phylloxérées au moyen du sulfocarbonate de potasse [K_2S_2 ČS] et sur le mode d'emploie de cet agent. (Comptes rendus, 10 Nov. 1879, v. 89; p. 774-766.) *G: D.* (2112)

Müller, Hermann. J. E. Taylor über Blumen, ihren Ursprung, ihre Gestalten, Gerüche und Farben. (Kosmos [Leipzig], May 1879, bd. 5, p. 149-157, 289 cm.)

Reviews J. E. Taylor's "Flowers, their origin, shapes, perfumes and colours;" compares it with C: Darwin's "On the various contrivances by which british and foreign orchids are fertilized by insects" and with J: Lubbock's "On british wild flowers considered in relation to insects." Discusses the geological age of insects and flowers. *G: D.* [2113)

Olivier, A. [Boîte à insectes.] (Feuille des jeunes naturalistes, Oct. 1880, an. 10, p. 162.)

A new sort of box for collections of insects; no description given. *G: D.* (2114)

Papilio cresphontes in New England. (Amer. nat., Nov. 1877, v. 11, p. 688, 3 cm.)

Crit. rev., by T: E. Bean, entitled "Northern occurrences of *papilio cresphontes.*" (Can. entom., Feb. 1878, v. 10, p. 35-36.)

Capture of the only specimen ever recorded from New England. [The review shows no nearer localities than W. Va., Ill. and Ontario.] *B: P. M.* (2115)

Poisonous caterpillar (A). (New remedies, Aug. 1879, v. 8, p. 256, 6 cm.)

Extract from a paper by E. D. Jones in *Journ. roy. micros. soc.*, June 1879, with note by editor of *New remedies.* *G: D.* (2116)

Riley, C: Valentine. The ailanthus silkworm, *attacus* (*samia*) *cynthia.* (Science news, 15 Oct. 1879, v. 1, p. 377-383.)

Natural history, description; comparison with *s. ricini*; introduction into various countries; adaptability to our climate; difficulties in reeling the silk; relative value of native and introduced silk-worms. *S: H.* (2117)

Riley, C: Valentine. [Habits of the cottonworm moth.] (Amer. nat., Nov. 1879, v. 13, p. 726.)

Believes that *aletia argillacea* passes the winter in the imago state only. *B: P. M.* (2118)

Ryder, J: A. An account of a new genus . . . [Rec., 1685].

Abstract. (Nature, 27 Nov. 1879, v. 21, p. 93, 6 cm.) *J. M. W.* (2119)

Schaupp, Frank G: Synoptic table of the genus *omophron* Latr. (Bull. Brooklyn entom. soc., May 1878, [v. 1], p. [5].)

Chiefly extracted from p. 71-75 of G: H: Horn's "Contributions to the coleopterology of the United States" (Trans. Amer. entom. soc., June 1870, v. 3, p. 69-97). *F. G: S.* (2120)

Scudder, S: Hubbard. Antigeny, or sexual dimorphism in butterflies. (Proc. Amer. acad. arts and sci., 1877, v. 12, p. 150-158.)

Separate, with t.-p., [Bost., 10 May] 1877, p. 150-158, 24×15, t 16.5×9.7.

Notice. (Amer. journ. sci. and arts, Sep. 1877, s. 3, v. 14, p. 244-245.)

Abstract. (Annals and mag. nat. hist., Feb. 1878, s. 5, v. 1, p. 184.)

Rev. by R. Meldola, entitled, "Butterflies with dissimilar sexes." (Nature, 24 April 1879, v. 19, p. 586-588, 62 cm.)

Colorational and structural differences between or in the sexes of various butterflies enumerated and classified; females more commonly aberrant than males; existence of androconia in males opposes the theory of sexual selection. *B: P. M.* (2121)

Scudder, S: Hubbard. Les premiers types d'insectes; origine et ordre de succession des insectes dans la période paléozoique. (Archiv. des sci. phys. et nat. Genève, 15 April 1880. p. 353-371. 8°.)

Translation [by Alois Humbert] of S: H. Scudder's "The early types of insects . . ." (Mem. Bost. soc. nat. hist., March 1879, v. 3, p. 13-21) [Rec., 1789]. The bibliographical notes, together with note 1 on p. 16 and note 2 on p. 19 of the original paper are omitted. *S: H. S.* (2122)

Scudder, S: Hubbard. The early types of insects . . . [Rec., 1789].

Fr. transl., by Alois Humbert, entitled "Les premiers types d'insectes; origine et ordre de succession des insectes dans la période paléozoique. (Archiv. des sci. phys. et nat. Genève, 15 April 1880. p. 353-371. 8°.) *S: H. S.* (2123)

Stefanelli, Pietro. 2nda memoria intorno alla conservazione delle libellule a colori fugaci. (Bull. soc. entom. ital., 1879, an. 11, p. 29-36, pl. 6.)

Abstract, entitled "Die Erhaltung der flüchtigen Farben der Libellen." (Entom. Nachrichten, 1 July 1880, jahrg. 6, p. 145.)

Directions for preserving living colors of *libellulidae*, by rapid drying of fresh specimens. *B: P. M.* (2124)

ENTOMOLOGICAL ITEMS.

Dr. Dutrieux, of the Belgian expedition engaged in explorations in Africa, sent home an entomological collection in the spring of 1879.

Mr. S. E. Cassino intends publishing a Directory containing the names, addresses, departments of study, etc., of the naturalists of the world.

During the last year a very convenient "Manual of the New Zealand coleoptera," prepared by Thomas Brown, and containing 672 pages, was published in Wellington, N.Z.

According to Gehe, in his Frühjahrsbericht for 1879, cantharidin is made chiefly from Chinese beetles, and is becoming considerably cheaper, in consequence of this new source.

Joseph Duncan Putnam, for several years previously the Corresponding Secretary of the Davenport (Iowa) academy of sciences, was elected President of the Academy for the ensuing year, 5 Jan. 1881.

At the election of officers held by the Cambridge Entomological Club, 14 Jan. 1881, the following persons were chosen: — *President*, E: Laurens Mark; *Secretary*, *Treasurer*, and *Editor of* Psyche, B: Pickman Mann; *Librarian*, Clifford Chase Eaton; *Executive Committee*, S: Hubbard Scudder, E: Payson Austin, E: Burgess.

Herbert H. Smith, author of "Brazil; the Amazons and the Coast," is to conduct another South American expedition. The route embraces some of the unexplored tributaries of the Amazons and the great tablelands of western Brazil and Bolivia. In his former explorations Mr. Smith made large collections of insects; some of his results of a day's collection of beetles are of interest, as on 17 Dec. he took 394 specimens of 275 species in about eight hours, on 29 Jan. 471 specimens of 268 species. In the East Indies, Wallace considered 40 to 60 species a good day's collecting, and gives 95 as the largest number ever taken.

SOCIETY MEETINGS.

The regular meetings of the Cambridge Entomological Club will be held at 19 Follen St., at 7.45 p.m., on the days following: —

8 Oct. 1880.
12 Nov. "
10 Dec. "
14 Jan. 1881.
11 Feb. "
11 Mar. 1881.
8 Apr. "
13 May "
10 June "

B : Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following:—

27 Oct. 1880.
24 Nov. "
22 Dec. "
26 Jan. 81.
23 Feb. 1881.
23 Mar. "
27 Apr. "
25 May "

B : Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following: —

8 Oct., 1880.
12 Nov. "
10 Dec. "
14 Jan. 1881.
11 Feb. "
11 Mar. 1881.
8 Apr. "
13 May "
10 June "

James H. Ridings, *Recorder.*

The semi-annual meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following: —

13 Dec. 1880.
13 June, 1881.

James H. Ridings, *Rec. Sec'y.*

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7 Sept. 1880.
5 Oct. "
2 Nov. "
7 Dec. "
4 Jan. 1881.
1 Feb. "
1 Mar. "
5 Apr. "

G : H. Bowles, *Secretary.*

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Due 15 Oct. 1882.— Life-histories of *Sclerostoma syngamus* and of *Strongilus pergracilis.* See Psyche, v. 3, p. 59.

ADVERTISEMENTS

should reach the editors by the 10th of the month preceding the one in which they are to appear.

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Department of Agriculture,
Washington, D. C.

No. 80 was issued 13 May 1881.

PSYCHE,

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

[Established in 1874.]

EDITED BY

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Vol. 3. No. 82.

FEBRUARY, 1881.

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CAMBRIDGE, MASS., U. S. A.: PUBLISHED BY GEORGE DIMMOCK.

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PSYCHE.

ON THE NUMBER OF MOLTS OF BUTTERFLIES, WITH SOME HISTORY OF THE MOTH *CALLOSAMIA PROMETHEA.*

BY WILLIAM H: EDWARDS. COALBURGH, W. VA.

(*Continued from Page 161.*)

Mr. Lintner, of Albany, N. Y. (Entom. Contributions, III, p. 129), speaks of four molts, though he does not say he saw the fourth. He speaks of first, second and third, and adds, "the subsequent moulting was not noticed," evidently considering that a fourth should take place, and probably he was aware that it had done so from the difference in markings between the larval stages.

Mr. Lintner states that the eggs were laid 17 June, and hatched in 19 days, 6 July. The second molt was passed 20 July; third molt 1 Aug. On 9 Aug., "some of the colony commenced the construction of their cocoons, 52 days from oviposition and 33 days from the disclosure of the larvae."

The larvae at Coalburgh, passing but three molts, had therefore but four stages. Stages 1 and 2 were essentially alike, the coloration being yellow with black stripes across the segments. At the second molt a radical change in coloration took place, and this stage, the third, and the following (or last) were in this respect essentially alike. The color was now, at second molt, whitish with a green tint; the black stripes had entirely disappeared and on each of segments 3 and 4 (head being segment 1) were two dorsal appendages much larger than other dorsals, cylindrical, high, light yellow, *with concolored spurs around the rounded summit*, and a black ring at base; on segment 11 was a single similar process on the medio-dorsal line. As the larva approaches the third molt, and about 24 hours before the same, the *four anterior processes gradually change color, turning first ochraceous, then dull orange, and so continue to the molt.*

After the third molt, or at the fourth and last stage, these processes have changed, *all having lost their crowns of spurs*, and become oval topped; those on segments 3 and 4 are red, and look like sealing wax, but the one in segment 11 retains its yellow color.

It will be seen therefore that (apart from several other differences which I might have specified) the *first two stages are black striped but the last two have no stripes*, and of these last two, the first has five yellow, *crowned knobs* or processes on dorsum, while in the last stage the *knobs have lost their crowns*, and four of them are red, one yellow. So that it is easy to distinguish apart the third and fourth stages, and indeed it is not possible to mistake one for the other.

I had bred these larvae in glasses and watched them several times every day. The moment I noticed a swelling on the second segment, which always precedes and advertises a molt in lepidopterous larvae, I separated the swollen larva and followed it carefully. I also preserved the casts of the face at each molt, and examples of the larvae in alcohol both at the beginning and end of each stage.

I looked further at Prof. Riley's description of the same moth (Fourth Missouri Report, p. 121). Mr. Riley gives four molts for this species, and says: "The first stage is yellow, with two transverse dark bands" (to each body segment). "In the second stage there is no essential change," etc. So far Prof. Riley and I agree in all points. He goes on: "In the third stage *the transverse stripes are more conspicuous*." Here we part, and this stage did not discover itself in my observations. "In the fourth stage (or after the third molt) . . . the *body is still paler* . . . the transverse *stripes are broader*," etc. This stage also is in addition to any observed by me. In the fifth stage (or after the fourth molt) the appearance is totally changed, the body is of the most delicate bluish-white . . . the four dorsals on segments 2 and 3" (my 3 and 4) "are at first yellow, with a black basal annulation, but they soon become red, that of joint 11" (my 12) "remains yellow," etc. Nothing is said of the crowns of spines on the dorsal processes, which I found a conspicuous feature at the stage after the second molt, or of a molt intervening between the processes being yellow and their being red (for the change in the processes which precedes the last molt is *not to red*, but *to ochraceous and then orange and no further*). It is evident then that Mr. Riley's fifth stage is equal to my third and fourth together, and that his third and fourth stages did not appear at all in my larvae. Certainly the larvae at Albany behave differently from those in Missouri, and both differ materially from those at Coalburgh. It has occurred to me that Prof. Riley's observations might have been made on larvae of *C. angulifera*, a form which he says he regards as a variety of *C. promethea*, but which I formerly bred, and then had no doubt of its distinctness from *promethea*. The periods of my brood of larvae were thus:—

Eggs laid 19 April.
Eggs hatched 1 May. Time 11 days.
Larva, 1st molt 7 May. " 6 "
" 2nd " 11 " " 4 "
" 3rd " 15 " " 4 "
In cocoon 22 May. " 7 "

Three ♂♂ moths issued 16 June. Time 25 days. Others at intervals for a month later.

Whole larval period 22 days.

From egg to imago, 58 days.

After correspondence with Mr. Lintner on the discrepancy of our observations, in which he thought I must have missed a molt, I bred a second lot of larvae from eggs laid by a female which emerged from the first lot of cocoons, on 20 June.

I found it paired in the box, and it laid 162 eggs, 21 June.

Eggs laid 21 June.
Eggs hatched 1 July. Time 10 days.
Larva, 1st molt 4 July. " 3 "
" 2nd " 9 " " 5 "
" 3rd " 13 " " 4 "
In cocoon 18 " " 5 "
First moths issued 12 Aug. Time 25 days.

Whole larval period, 18 days.

From egg to imago, 52 days.

The behavior of the pupae of this brood was in this way. On 12 Aug., 2 ♂ emerged. As I desired to keep examples of the moth of each brood for comparison, I killed these, expecting to see plenty more. On 13 Aug. 3 ♀ emerged; on 14, 1 ♀; on 15, 2 ♀; on 16, 1 ♀; on 17, 1 ♀; and no more of either sex appeared. So I lost the opportunity of mating any females in the boxes. I tied all these ♀ ♀ out at night and kept them out several nights, bringing them to the house during daylight, until all of them were broken up, but in no case did a male visit them. That means that at this period no wild males were flying in the vicinity. Had I kept the males which issued 12 Aug., another brood would have been raised, making the third in succession. As it was, the females tied out laid many unimpregnated eggs on the trees to which I confined them. Another ♀ emerging from the first lot of cocoons on 16 July gave me another opportunity of verifying my observations.

Eggs laid 17 July.
Eggs hatched 27 July. Time 10 days.
Larva, 1st molt, 1 Aug. " 4 "
Larva, 2nd molt, 6 Aug. Time 5 days.
" 3rd " 11 " " 5 "
In cocoon 18 " " 7 "
Whole larval period 22 days.

No moths issued from this lot, but all the cocoons are wintering. About two-thirds of the cocoons from the eggs laid 21 June gave imagos, and about one-third are wintering. But both these last broods, as I have said before, came from the first lot of cocoons.

I was careful at all points in these two broods, the more so as my attention had been directed to the different results between my observations and others recorded. The rapidity of the changes in both broods, caused by the hot weather, no doubt, will be noticed, in one brood but 3 to 5 days intervening between any of the molts, in the other from 4 to 5. In the last stage of the second brood the time was 7 (from third molt to cocoon). In this last brood it happened that I painted red a part of the last segment of every larva just after the third molt. These red marks were not lost, but stuck to the larvae till they disappeared in their cocoons. I do not remember ever reading of this device for identifying larvae, but with light colored and smooth-skinned ones, it answers admirably.

So I am thoroughly satisfied that *C. promethea*, at Coalburgh, passes but three molts, and it becomes very probable that this species at least varies in the number of molts with the latitude or locality. At Albany, N.Y., I suppose there is but one annual brood. Mr. Lintner found the period from the laying of eggs to cocoons, mostly in midsummer, to be 52 days. At Coalburgh, the broods ran from 33 days in April and May to 28 days in June and July. The larval period only at Albany was 33 days, at Coalburgh 22 and 18 days. Perhaps in attaining to a double or triple annual generation, the species has come to have its larval stages diminished by one, and in W. Va. molts three times while at Albany it molts four times.

Mr. Trouvelot (Amer. Nat., v. 1, p. 37) has recorded his observations on the allied silk-worm moth *Telea polyphemus*, and says; "The *polyphemus* worm, *like all other silk worms, changes its skin five times during its larval life.*"

In the Entomologist, London, 1879, v. 12, p. 26 et seq., Mr. P. H. Gosse details at great length the larval history of *Attacus atlas* from farther Asia, bred by him from eggs obtained from the female which had emerged from cocoon in Europe. He describes in full five molts.

The only other large moth whose larval stages I have carefully watched is *Dryocampa imperialis*, which has four molts only.

EFFECT OF COLD APPLIED TO CHRYSALIDS OF *LIMENITIS DISIPPUS.*

BY WILLIAM H. EDWARDS, COALBURGH, W. VA.

I SUCCEEDED in bringing two larvae through the last winter. No. 1 pupated at 3 P. M., 22 April. At 9 P. M., same day, I placed the chrysalis in an ice box, where it remained till 9 P. M., 6 May, 14 days. No. 2 pupated at 7 P. M., 27 April, and at 7 A. M., next day, the chrysalis was put on ice and remained till 7 A. M., 7 May, 10 days. Temperature, 40° F. [4° C.]. (In 1880, I subjected two chrysalids of this species to a temperature of 32° F. [0° C.], and killed both.)

On 13 May, two butterflies emerged: from No. 1, a ♂; the other ♀. Both are alike in color above and below: above dark, resembling southern *Danais archippus*. In the ♂, the black mesial band on hind wings is wider than usual, though I have one example, bred at Coalburgh, like it; but in the female, this band is extraordinary, nearly three times as wide as usual, measuring 2.5 mm. at the cell. Beneath, in both, the whole hind wing is very light, a fawn-color, with no fulvous tint, quite unlike any Coalburgh or western or southern example, though resembling Catskill examples, except that these have a tint of fulvous.

As appears, the change is most decided in the female, though this was exposed when 12 hours old and for 10 days only, against 14 days in the male, at 6 hours old.

I had hoped to see the butterflies much melanized, and so approaching *Limenitis proserpina*, from which it has been conjectured *disippus* is derived. But nothing has occurred in support of that view.

PSYCHE.

CAMBRIDGE, MASS., JAN. 1881.

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REVIEW.

DR. HERMANN MÜLLER'S Alpenblumen [PSYCHE, Rec., no. 2175] is the most recent contribution to our knowledge of the mutual relations between flowers and insects, by an author whose studies of the fertilization of flowers include the habits of the insects by which this is effected.

After the publication of his work on the pollination of flowers, in 1873, Dr. Müller turned his attention to the plants growing at a considerable elevation above the sea-level, a field which his earlier studies had shown him to be deserving of special attention. The book before us shows that he has been no less thorough in this than in his earlier work.

Following the descriptions of the floral contrivances — if we may use this word in the sense accorded it by modern teleology — of over 400 species of plants, are systematic lists of the insects found upon each, including the frequency and object of their visits, and, in the case of lepidoptera and hymenoptera, the length of their proboscides or tongues. About one fourth of the volume is devoted to a consideration of the more interesting topics suggested by the facts observed, the entomological bearings of the questions receiving their full share of attention. The relative frequency of insects belonging to the different orders is discussed at length while the writer is considering flowers with wholly accessible, partly concealed, and deep-lying nectar, and the results are tabulated for convenient inspection. Flowers of the first sort have a mixed set of visitors, those with little-elongated mouth parts predominating; as the nectar becomes more and more inaccessible to these, the proportion of long-tongued species increases gradually, till, where it is deep-seated, bees and lepidoptera include by far the greater number of the insects which gather it, and large numbers of flowers of characteristic form and coloration are wholly or in great part dependent upon each of these orders for their pollination. The author finds that under favorable conditions the number of insect-visits to flowers which may be observed within a given time in alpine regions is even larger than at lower altitudes, this being dependent upon the consolidation of vegetation into dense masses of bloom, and the necessity for improving every favorable moment which the frequent mists and cold winds of high altitudes impose upon flower-frequenting insects. As the distance above the sea increases, the relative abundance of coleoptera and hymenoptera about flowers falls off, while the proportion of diptera and lepidoptera largely increases. A valuable feature of the work is a systematic list of the insects observed, the name of each species being followed by a list of the flowers which it frequents, and the degree of their adaptation from general to special insect groups.

Although it is to be considered as a contribution to botany rather than to entomology, Dr. Müller's "Alpenblumen" should make a welcome addition to the library of the entomologist who believes that biological studies have their value as well as those which are purely morphological.— *William Trelease.*

RECORDS OF NECROLOGY.

Undoubtedly the names of many entomologists who died in the years 1879 and 1880 have still escaped record in our pages, as well as many notices of the persons whose names are given here. We will welcome gladly any contribution to the record from our friends or from friends of the deceased.

B: P. M.

BIBLIOGRAPHICAL RECORD.

NECROLOGY FOR 1879.

ADDITIONAL TO REC., 1501–1518, AND 1555.

Atkin, T: [Biog. notice.] (Entomologist, Jan. 1880, v. 13, p. 24.)

Mr. Atkin, b. 5 May 1813, at Stapleford, Eng., d. 8 Nov. 1879, at Nottingham, Eng. *B: P. M.* (2125)

Berce, Jean Étienne. [Biog. notices.] (Zool. Anzeiger, 22 March 1880, jahrg 3, p. 144.) (Psyche, May [July] 1880, v. 3, p. 71.) (Entomologist, May 1880, v. 13, p. 119–120.) (Entom. m. mag., March 1880, v. 16, p. 236.)

Mr. B., lepidopterist, was b. in 1802; d. 29 Dec. 1879, in Paris. *G: D.* (2126)

Boisduval, Jean Baptiste Alphonse Déchauffoir. [Biog. notices.] (Zool. Anzeiger, 22 March 1880, jahrg. 3, p. 144.) (Psyche, May [July] 1880, v. 3, p. 71.) (Entom. Nachrichten, 1 July 1880, jahrg. 6, p. 150.) Entomologist, May 1880, v. 13, p. 119.) Entom. m. mag., March 1880, v. 16, p. 235–236.)

"GIRARD, Maurice. Notice nécrologique sur le docteur Boisduval. Paris, 1880. 8°. 6 p. Extr. du Journ. centr. d'horticult., 3 sér., t. 2." [According to Zool. Anzeiger, 29 Nov. 1880, jahrg. 3, p. 573.]

Dr. Boisduval, lepidopterist, was b. in 1799, in Ticheville, Normandy, France; d. 30 Dec. 1879, in Paris, France. *G: D.* (2127)

Chapman, T: [Biog. notice.] (Entomologist, Dec. 1879, v. 12, p. 299–300.)

[*See* Rec., 1502.] *G: D.* (2128)

Chenu, Jean C: [Biog. note.] Zool. Anzeiger, 22 March 1880, jahrg. 3, p. 144.)

[*See* Rec., 1505.] *G: D.* (2129)

Cooper, James. [Biog. notice.] (Entomologist, Nov. 1879, v. 12, p. 280.)

G: D. (2130)

Fitch, Asa. [Biog. notices.] (Amer. entom., May 1880, v. 3, p. 121–123.)

[*See* Rec. 1507 and 1995.] *G: D.* (2131)

Fritsch, Carl. [Biog. notices.] (Zool. Anzeiger, 8 March 1880, jahrg. 3, p. 120.) (Psyche, May [July] 1880, v. 3, p. 71.) (Aus allen Welttheilen, April 1880, jahrg. 11, p. 213.)

B. 16 Aug. 1812, in Prague, Bohemia; d. 26 Dec. 1879, in Salzburg, Austria. At the time of his death Dr. Fritsch was Vice-director (emeritus) of the Central-Anstalt für Meteorologie und Erdmagnetismus in Vienna. He has written upon insect-phaenology. *G: D.* (2132)

"**Goureau**, Claude C: [Biog. sketch, by Henri Miot, entitled "Notice nécrologique sur le colonel Goureau."] (Annal. Soc. entom. France, 1879, s. 5, v. 9, p. 389–400.)"

Col. Goureau, entomological writer, was b. 15 April 1790, in Pisy, Yonne, France; d. 6 Feb. 1879, in Paris, France. *G: D.* (2133)

Greening, Noah. [Biog. notices.] (Entomologist, Dec. 1879, v. 12, p. 300.) (Entom. m. mag., Dec. 1879, v. 16, p. 167.)

G: D. (2134)

Haag, Georg. [Biog. sketch, by G. Kraatz, entitled "Necrolog."] (Deutsche entom. Zeitschr., May 1880, jahrg. 24, p. 231–235.)

[Biog. sketch, by C. A. Dohrn, entitled "Necrolog."] (Entom. Zeitung . . . zu Stettin, Jan.–Mar. 1880, jahrg. 41, p. 111–113.)

[Biog. note.] (Entomologist, May 1880, v. 13, p. 120.)

[*See* Rec., 1555.] *G: D.* (2135)

Kirchner, Leopold Anton. [Biog. notice.] (Entomologist, May 1880, v. 13, p. 118–119.) Zool. Anzeiger, 5 April 1880, jahrg. 3, p. 168.)

[Biog. sketch, by R. Stein, entitled "Nekrolog."] (Entom. Nachrichten, 15 March 1880, jahrg. 6, p. 60–61.)

Dr. Kirchner, a practising physician in Kaplitz, Bohemia, and author of papers on hymenoptera, d. in Kaplitz, 29 Dec. 1879. *G: D.* (2136)

Loew, Hermann. [Biog. sketch, by F. Kowarz, entitled "Professor Dr. Hermann Loew."] (Sitzungsber. d. k.-k. zool.-bot. Gesells. Wien, Nov. 1879, bd. 29, p. 45–47.)

[Biog. sketch (by Ernst Krause).] (Deutsche entom. Zeitsch., 1879, jahrg. 23, p. 419–423.)

[*See* Rec., 1510.] *G: D.* (2137)

Plieninger, Theodor Wilhelm Heinrich [Biog. notice.] (Zool. Jahresbericht f. 1879, p. 5.)

Entomological writer; professor in Stüttgart, Würtemberg; secretary of the agricultural society in Würtemburg. B. 17 Nov. 1795; d. 26 April 1879. *G: D.* (2138)

Reichenbach, Heinrich Gottlieb Ludwig. [Biog. notice.] (Amer. journ. sci. and arts, Jan. 1880, v. 19, p. 77.)

[*See* Rec., 1514.] *G: D.* (2139)

Rondani, Camillo. [Biog. notice.] (Entomologist, May 1880, v. 13, p. 120.)

[*See* Rec., 1515.] *G: D.* (2140)

Saunders, W: Wilson. [Biog. notice.] (Zool. Anzeiger, 3 Nov. 1879, jahrg. 2, p. 576.) (Entomologist, Nov. 1879, v. 12, p. 278–280.)

[*See* Rec., 1516.] *G: D.* (2141)

Smith, F: [Biog. note.] (Amer. nat., Sept. 1879, v. 13, p. 600.)

[*See* Rec., 1517.] *G: D.* (2142)

NECROLOGY FOR 1880.

Boll, Jacob. [Biog. notices.] (Naturae novitates, Dec. 1880, no. 23, p. 196.) (Amer. nat., Jan. 1881, v. 15, p. 84-85.) (Entom. m. mag., Feb. 1881, v. 17, p. 213-214.) (Entom. Nachrichten, 15 Feb. 1881, jahrg. 7, p. 68.) (Mitth. d. schweiz. entom. Gesells., , bd. 6, p. .)

Mr. Boll, entomologist especially interested in microlepidoptera, was b. 29 May 1828 in the canton of Aargau, Switzerland; d. 29 Sept. 1880, in Western Texas. [*See also* Rec., 1926–1927.] *G: D.* (2143)

Buckland, Francis Trevelyan. [Biog. notices.] Colonies and India, 25 Dec. 1880, p. 18, 10 cm.) (Amer. nat., Feb. 1881, v. 15, p. 175.) (Journ. applied sci., Feb. 1881, v. 12, p. 27, 5 cm.) (Zool. Anzeiger, 7 March 1881, jahrg. 4, p. 120.)

Mr. Buckland, usually known as Frank Buckland, a popular writer on natural history, and a fish-culturist, was b. 17 Dec. 1836; d. 19 Dec. 1880, in London, England. *G: D.* (2144)

Castelnau, François. [Biog. notices.] (Naturae novitates, April 1880, no. 7, p. 62.) (Zool. Anzeiger, 5 April 1880, jahrg. 3, p. 168.) (Amer. nat., July 1880, v. 14, p. 548-549.)

Count Castelnau, entomologist and ichthyologist, French consul in Melbourne, Australia; d. in Melbourne, 4 Feb. 1880. *G: D.* (2145)

Cooke, Caleb. [Biog. notices.] (Amer. nat., Aug. 1880, v. 14, p. 614.) (Psyche, Aug. [4 Nov.] 1880, v. 3, p. 107.) (Zool. Anzeiger, 18 Oct. 1880, jahrg. 3, p. 528.)

Mr. Cooke, a collector in various departments of zoology, especially of entomology, was b. Feb. 1838; d. 5 June 1880, in Salem, Mass. *G: D.* (2146)

Cox, H: Ramsay. [Biog. note.] (Zool. Anzeiger, 18 Oct. 1880, jahrg. 3, p. 528.) (Entomologist, Oct. 1880, v. 13. p. 248.)

Mr. Cox, an entomologist, 36 years old, d. 3 Sept. 1880, in Forest Hill, England. *G: D.* (2147)

Grube, Adolph Eduard. [Biog. notices.] (Zool. Anzeiger, 5 July 1880, jahrg. 3, p. 336.)

"ZADDACH, G. Adolph Eduard Grube. Gedächtnisrede. Königsberg [1880]. 8°. [32 p.]" (According to Zool. Anzeiger, 24 Jan. 1881, jahrg. 4, p. 25.]

Dr. Grube, professor of zoology in Breslau (formerly in Königsberg and in Dorpat), author of entomological papers, was b. 18 May 1812, in Königsberg, Prussia; d. 23 June 1880, in Breslau, Prussia. *G: D.* (2148)

Guénée, Achille. [Biog. notices.] (Entom. Nachrichten, 15 Feb. 1881, jahrg. 7, p. 68.) (Amer. nat., March 1881, v. 15, p. 261.) (Zool. Anzeiger, 7 March 1881, jahrg. 4, p. 120.)

[Biog. notice, by E: A. Fitch, entitled "Obituary of Achille Guenée." (Entomologist, Feb. 1881, v. 14, p. 48.)

[Biog. notice, entitled "Obituary of Achille Guénée."] (Entom. m. mag., Feb. 1881. v. 17, p. 214-216.)

Biographical sketch of M. Achille Guénée. By A: R. Grote. (Papilio, 10 March 1881, v. 1, p. 31-33.)

M. Guénée, lepidopterist, was b. 1 Jan. 1809, in Chartres, France; d. 30 Dec. 1880, in Châteaudun, near Paris, France. *G: D.* (2149)

Günther, O: R: [Biog. notice, by T. A. D(ickinson).] (Can. entom., May 1880, v. 12, p. 99.)

Mr. Günther, coleopterist, was b. 7 Sept. 1855, in Worcester, Mass., where he d. 27 Feb. 1880. *G: D.* (2150)

Haldeman, S: Stehman. [Biog. notices.] (Amer. nat., Oct. 1880, v. 14, p. 755-756.) (Can. entom., Oct. 1880, v. 12, p. 220.) (Naturae novitates, Oct. 1880, no. 20, p. 168.) (Zool. Anzeiger, 1 Nov. 1880, jahrg. 3, p. 552.)

Dr. Haldeman, professor of philology in the University of Pennsylvania, author of numerous articles on conchology, entomology, and palaeontology, was b. in 1812, near Columbia, Penn.; d. 10 Sept. 1880, in Chickis, Penn. *G: D.* (2151)

Hamm, Wilhelm. [Biog. note.] (Leipziger Tageblatt u. Anzeiger, 1 Jan. 1881, jahrg. 75, no. 1, p. 5, col. 2.)

Dr. W. von Hamm, imperial ministerial councilor, writer on agricultural subjects and upon *phylloxera*, d. 8 Nov. 1880, in Vienna, Austria. *G: D.* (2152)

Hartig, Theodor. [Biog. notes.] (Naturae novitates, April 1880, no. 7, p. 62.) (Entom. Nachrichten, 1 July 1880, jahrg. 6, p, 151-152.) (Entomologist, Aug. 1880, v. 13. p. 192.)

Prof. Dr. Hartig, economic entomologist, was b. 21 Feb. 1805, in Dillenburg, Prussia; d. 26 (? 30) March 1880, in Brunswick, Prussia. *G: D.* (2153)

Hartmann, August. (Biog. notice, by Joseph Kriechbaumer.] (Entom. Nachrichten, 1 July 1880, jahrg. 6, p. 148-149.)

Herr Hartman, microlepidopterist, was b. in 1807, in Ansbach, Bavaria; d. 27 May 1880, in München, Bavaria. *G: D.* (2154)

Hnateck, J. S. [Biog. notice, by Alexander Homeyer.] (Entom. Nachrichten, 15 March 1880, jahrg. 6, p. 61-62.)

Herr Hnateck, collector of insects in the Upper Engadine, Switzerland, was b. 23 Jan. 1801, in Berlin, Prussia; d. 26 Jan. 1880, in Sils-Maria, Switzerland. *G: D.* (2155)

Jones, T: Rymer. [Biog. note.] (Amer. nat., Feb. 1881, v. 15, p. 175.)

Dr. Jones, professor of comparative anatomy in King's College, London, Eng., was b. in 1810; d. in Dec. 1880. *G: D.* (2156)

Kiesenwetter, Ernst August Hellmuth. [Biog. notices.] (Naturae novitates, April 1880, no. 7, p. 62.) (Zool. Anzeiger, 3 May 1880, jahrg. 3, p. 216.) (Entomologist, May 1880, v. 13, p. 120.) (Amer. nat., June 1880, v. 14, p. 468.) (Entom. Nachrichten, 1 July 1880, jahrg. 6, p. 150-151.)

"Kirsch, Th. E. Helm. von Kiesenwetter, in: Leopoldina, xvi. Heft, no. 9-10, p. 67-70." [According to Zool. Anzeiger, 24 Jan. 1881, jahrg. 4, p. 25.]

Herr von Kiesenwetter, general writer upon entomology but especially upon coleoptera, was b. 5 Nov. 1820, in Dresden, Saxony, where he d. 18 March 1880. *G: D.* (2157)

Kirschbaum, Carl Ludwig. [Biog. notices.] (Zool. Anzeiger, 5 April 1880, jahrg. 3, p. 168.) ("Niederrheinischen Zeitung" . . . .) (Entom. Nachrichten, 15 April 1880, jahrg. 6, p. 85-87.) (Deutsche entom. Zeitschr., May 1880, jahrg. 24, p. 236.) (Entom. Zeitung . . . zu Stettin, April-June 1880, jahrg. 41, p. 249.]

Dr. Kirschbaum, professor in Wiesbaden, Prussia, an entomological writer especially upon hemiptera, was b. 31 Jan. 1812, in Usingen, Prussia; d. 3 March 1880, in Wiesbaden. *G: D.* (2158)

Lokaj, Emanuel. [Biog. notice, entitled "Necrolog," by R. Stein.] (Entom. Nachrichten, 15 Nov. 1880, jahrg. 6, p. 257-258.)

Herr Lokaj, collector of insects and entomological writer, 57 years of age, d. 28 April 1880, in Prague, Bohemia. *G: D.* (2159)

Menge, Anton. [Biog. notices.] (Zool. Anzeiger, 8 March 1880, jahrg. 3, p. 120.) (Naturae novitates, March 1880, no. 6. p. 54.) (Deutsche entom. Zeitschr., May 1880, jahrg. 24, p. 237.)

Dr. Menge, araneologist, was b. 10 Feb. 1808, in Arnsberg, Prussia; d. 27 Jan. 1880, in Danzig, Prussia. *G: D.* (2160)

Mulsant, Étienne. [Biog. notices.] Naturae novitates, Dec. 1880, no 23, p. 196.) [Entom. Nachrichten, 15 Jan. 1881, jahrg. 7, p. 36.) (Zool. Anzeiger, 7 March 1881, jahrg. 4, p. 120.) (Amer. nat., March 1881, v. 15, p. 262.)

[Biog. notice, by J: O. Westwood, entitled "Obituary of Étienne Mulsant."] (Entom. m. mag., Jan. 1881, v. 17, p. 189-190.)

(**Mulsant**, Étienne.)

[Biog. notice, by E. A. Fitch, entitled "Obituary of Étienne Mulsant."] (Entomologist, Feb. 1881, v. 14, p. 46-47.)

M. Mulsant, librarian of the University of Lyons, writer on ornithology and entomology (especially coleoptera), was b. 2 March 1797, in Marnard, France; d. 4 Nov. 1880, in Lyons, France. *G: D.* (2161)

Ougspurger, Philibert Friedrich. [Biog. notice, by Albert Müller, entitled "Naturhistorisches Museum."] (Intelligenzblatt für die Stadt Bern [Switzerland], 29 Nov. 1880, jahrg. 47, no. 331, p. 4, col. 2, 10 cm.) (Entom. Nachrichten, 1 Jan. 1881, jahrg. 7, p. 14-15.)

Herr von Ougspurger, coleopterist, d. 5 Nov. 1880, in Bern, Switzerland. *G: D.* (2162)

Owen, Francis. [Biog. note.] (Entomologist, Dec. 1880, v. 13, p. 312.)

Mr. Owen, lepidopterist, d. 21 Oct. 1880, at Kintbury, Surrey, Eng. *B: P. M.* (2163)

Smith, G: D. [Biog. notice.] (Amer. nat., Oct. 1880, v. 14, p. 756.)

Mr. Smith, coleopterist, author of no papers on entomology, but possessor of a collection of about 13000 species of coleoptera, d. in Cambridge, Mass., 6 July 1880, in his 46th year. *G: D.* (2164)

Snellen van Vollenhoven, S: Constant. [Biog. notices.] (Zool. Anzeiger, 19 April 1880, jahrg. 3, p. 192.) (Entom. Zeitung . . . zu Stettin, April-June 1880, jahrg. 41, p. 249.) (Amer. nat., June 1880, v. 14, p. 468.) (Entom. Nachrichten, 1 July 1880, jahrg. 6, p. 147.) (Entomologist, May 1880, v. 13, p. 117-118.) (Deutsche entom. Zeitschr., May 1880, jahrg. 24, p. 238.)

Herr Snellen van Vollenhoven, director of the entomological section of the zoological museum in Leiden, Holland, was b. 18 Oct. 1816, in Rotterdam, Holland; d. 22 March 1880, in the Hague. *G: D.* (2165)

Spagnolini, Alessandro. [Biog. notice, by P. Pavesi, entitled, "Necrolog."] (Zool. Anzeiger, 21 June 1880, jahrg. 3, p. 312.)

Dr. Spagnolini, professor of natural science in Florence, Italy, an entomological writer, was b. in 1833, in Livorno, Italy, in which city he died in March 1880. *G: D.* (2166)

Stauffer, Jacob. [Biog. notice.] (Amer. nat., June 1880, v. 14, p. 466.)

Mr. Stauffer, entomologist, b. in Lancaster county, Penn.; d., aged 72, in Lancaster, Penn.; he is said to have kept no collection, but made drawings of his captures. *G: D.* (2167)

Standish, Francis Oram. [Biog. notices.] (Zool. Anzeiger, 7 June 1880, jahrg. 3, p. 288.) (Entomologist, June 1880, v. 13, p. 142.)

Mr. Standish, lepidopterist, d. 12 April 1880, in Cheltenham, England; aged 48 years. *G: D.* (2168)

ENTOMOLOGICAL ITEMS.

Eugene M. Aaron, 27 South 4th St., Philadelphia, Pa., wishes to receive the larvae of any butterflies, especially 100 to 150 specimens of the papilios *ajax*, *asterias*, *philenor*, *troilus* and *turnus;* he will, if desired, return to the senders the imagos raised from these larvae, and repay the postage. Pack specimens securely in small strong boxes, with the plant on which they are feeding.— *Science advocate*, Oct. 1880, v. 1, no. 4, p. [3].

The collection of coleoptera left by the late George D. Smith, of Cambridge, Mass., and now offered for sale, comprises 8926 North American species, 489 of which are undescribed. 109 varieties and 22835 specimens systematically arranged and in perfect condition; 5037 South American species and 7947 specimens, systematically arranged and in good condition; besides 14789 North American and 1782 South American duplicates and specimens still remaining in the boxes in which they were purchased from the collectors.

The New York Entomological Club, recently formed in New York City, with Augustus Radcliffe Grote as President, Henry Edwards as Secretary, and Berthold Neumoegen as Treasurer, meets twice monthly, and has begun under the direction of Messrs. Grote, Edwards and Theodore Luqueer Mead, the publication of an octavo monthly entitled "Papilio. Devoted to lepidoptera exclusively. Organ of the New York Entomological Club." We understand that if sufficient encouragement is received the Club hopes at some future time to publish also a "Vespa," a "Blatta," a "Musca," etc., to cover the other groups of insects. "Papilio" will appear during ten months of each year; the annual subscription price is $2.00; subscriptions and communications should be addressed to Mr. Henry Edwards, 185 East 116th Street, New York, N. Y.

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10 Dec. "
14 Jan. 1881.
11 Feb. "
11 Mar. 1881.
8 Apr. "
13 May "
10 June "

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following:—

27 Oct. 1880.
24 Nov. "
22 Dec. "
26 Jan. 81.
23 Feb. 1881.
23 Mar. "
27 Apr. "
25 May "

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following: —

8 Oct., 1880.
12 Nov. "
10 Dec. "
14 Jan. 1881.
11 Feb. "
11 Mar. 1881.
8 Apr. "
13 May "
10 June "

James H. Ridings, *Recorder.*

The semi-annual meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following: —

13 Dec. 1880.
13 June, 1881.

James H. Ridings, *Rec. Sec'y.*

The regular monthly meetings of the Montreal Branch of the Entomological Society of Ontario will be held at Montreal, Que., Canada, on the days following: —

7 Sept. 1880.
5 Oct. "
2 Nov. "
7 Dec. "
4 Jan. 1881.
1 Feb. "
1 Mar. "
5 Apr. "

G: H. Bowles, *Secretary.*

PRIZE ESSAYS.

Due 15 Oct. 1882.— Life-histories of *Sclerostoma syngamus* and of *Strongilus pergracilis.* See Psyche, v. 3, p. 59.

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EDITED BY

GEORGE DIMMOCK, *Cambridge, Mass.;* B: PICKMAN MANN, *Cambridge, Mass.;*
ALBERT J: COOK, *Lansing, Mich.;* CLIFFORD CHASE EATON, *Cambridge,*
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MARCH 1881.

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CAMBRIDGE, MASS., U. S. A.: PUBLISHED BY GEORGE DIMMOCK.

YEARLY SUBSCRIPTIONS, $1. MONTHLY NUMEROS, 15 c.

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PSYCHE.

INSECTS IN WINTER.

BY ALBERT JOHN COOK, LANSING, MICH.

The condition of our vertebrate animals in winter, and also the functional condition of their organs, have been well studied and are pretty well understood. That most of them require more carbonaceous food at this season, as this ministers to the special kind of nutrition which supplies animal heat, is a well recognized fact. It has long been known that some vertebrates hibernate, in which state they respire very slowly, and so are able to live even though the heart does circulate unoxidized blood.

The functional activity of the organs in this case is reduced to the minimum, and so nutrition is almost abated, and no food is required other than that stored up in the adipose tissue. But even though these animals do live so slowly, with too severe and long continued cold they often lose even this little vitality and perish.

Physiologists have determined that tissues and organs, whether *in situ* or removed from the body, will maintain their vitality for a long time, and often indefinitely, if kept in a cold atmosphere, though all functional activity is for the time held in abeyance. I myself have exposed hens' eggs, while in the process of incubation, to a temperature but little above 0° C., until I had good reason to believe that the hearts of the embryo chicks had ceased to beat. I then replaced the eggs under the brooding hen, when with the return of heat came also a resumption of development. Very likely the same explanation may rightly account for the retarded development in many tadpoles that pass the winter in an immature state. Most frogs develop fully in summer, and pass the winter in a mature state. Yet we not infrequently find tadpoles in mid-winter, or large ones at the very dawn of spring.

If all animals have had a common origin (and can any biologist doubt it?), we may expect that the phenomena observed among invertebrates will closely resemble the peculiarities which we note in our study of the higher forms.

The effects of cold to stay or retard development among insects, though perhaps not so long and closely studied as have been the same influences as they worked to modify development among the vertebrates, will be found, I feel quite sure, to act in a very similar way.

The winter of 1874–75 was one of the most severe ever experienced in the northern United States. In the month of February of that year, the temperature fell below zero of the Fahrenheit scale (—17.°8 C.), at Lansing, Michigan, twenty-one times. The mercury showed —20° F. (—28.°9 C.) on eight different days, and —30° F. (—34.°4 C.) twice. Surely this was a good time to study the effects of cold upon insect life.

The codling moth insect (*Carpocapsa pomonella*), as is well known, passes the winter, in the larval state, protected only by a slight silken cocoon, and some bark scale, crevice, or similar covering. The spring following the severe season just referred to I found that nearly all these larvae that had passed the winter out doors about the apple trees were dead, a circumstance I have never observed at any other time. The fact that this mortality was not due to parasites, that there was no climatic peculiarity during that winter other than the cold, especially as the larvae in cellars and kitchens were healthy and lively, points strongly to the severe cold as the cause of this welcomed mortality. If this inference is correct, we must conclude that insects which freeze up in winter may succumb to very severe cold.

Farmers long since observed that clover sward ploughed in autumn, and planted to corn the following spring, was less liable to be attacked by cut-worms, than when ploughed in spring, and immediately planted. This has led to the very general belief among farmers, which view is adopted by several noted entomologists, that exposure to the cold, especially to alternate freezing and thawing, is what destroys the cut-worms. During the very severe winter already referred to, I subjected some cut-worms—larvae of species of *Agrotis* — to intense cold, and to alternate cold and heat, which seemed in no wise to injure them. Others were exposed very much as they would be by fall ploughing, and yet passed the winter in safety. The farmers are doubtless correct in thinking that fall ploughing is a protection against these marauding cut-worms; but wrong in their explanation. Exposure to insectivorous birds and not to cold is the more probable solution, especially as frequent cultivation of the land in autumn and spring, when birds are plenty, is found to greatly augment the destruction of insects.

The late Mr. Quinby, in his work on bee keeping, states that the larva of the bee-moth, *Galleria cereana*, cannot survive exposure to the cold; that if these larvae are removed from the hive and its genial heat, during the winter, they surely die. Mr. G. M. Doolittle reports that he has observed these bee-moth caterpillars in exposed positions, and that they have survived even the present rigorous winter of 1880 and 81. I have often noticed these larvae and the chrysalids, which have passed the winter in cold rooms outside the hives. Still from the natural surroundings of these insects we may easily believe that they have developed a constitution more susceptible to the cold than insects whose habits bring more exposure.

Mr. W. H. Edwards has shown how the development of butterflies may be retarded by the cold. The bearing of these experiments upon the formation of different broods of a species and characteristic markings of each brood is of very great interest.

Among honey bees of the genus *Apis*, we note peculiarities in respect to cold, which, like their habits and instincts, seem to separate them widely from most other insects, and strongly remind us of the vertebrates. Most insects freeze up in winter, so that all their functional activities are held in abeyance, ready to start into action at the touch of revivifying warmth, which ever comes with returning spring. A few of the higher ones really hibernate. There is slight activity of the tissues which is sustained by the stored-up fat cells of the body. The species of *Apis*, on the other hand, remain active, take food, and resemble more closely the higher vertebrates. In a nearly uniform temperature of from 3° to 8° C. the domestic honey bees remain very quiet, take but little food, and only move as the cold at the outside of the cluster impels them to crowd towards the centre, or as the absence of food in any part of the hive impels the whole cluster to change its position. If the temperature outside the hive is maintained within the limits mentioned above, the bees will eat so little, and there will be so little dis-assimilation in the body, that all the excrementitious substances, except such as pass off with the breath, — and this last is very slight at such times — are easily and safely held in the intestines for so long a space as five or six months. But if the temperature immediately without the hive is for any considerable period lowered much below the point mentioned above, the bees attempt to increase the animal heat by action, and by increased consumption of honey, which among vertebrates is typical as a heat producing food. This leads to an excessive accumulation of fecal matter within the intestines, which consists of the undigested food and the waste products which are the resultant of functional activity. In this condition, bees must soon fly forth to void their feces, which in normal circumstances they only do while on the wing, or soon they will be attacked by fatal dysentery. The above is undoubtedly the rightful explanation of the exceeding mortality among bees the past winter. In many parts of the more northern states, bees have been confined to their hives for five months, and in almost all cases where they have not been protected from the severe cold, they have died. Those wintered in suitable cellars are safe and healthy, and many protected out doors by a thick wall of chaff about their hives are saved from death. I have found by weighing the honey in the fall and in the spring, that bees kept in the right temperature during the past winter have consumed never more than ten pounds (4 Kg. 5) of honey to the colony, while all colonies exposed to the severe cold have taken more than twice that amount. The former have wintered well, the latter have sickened and died.

If bees are confined in winter, and the temperature be raised much above 10° C., the heat becomes a serious irritant, and the bees, unless their hives are very well ventilated, and unless they are soon enabled to fly out from their hives, will speedily die.

It is an interesting fact that bees require only the carbo-hydrates for food in winter. They will winter better on clear honey or even pure cane sugar than when well supplied with the nitrogenous pollen. I think the reason of this is, that in the first case they are prevented from the activity which follows upon brood rearing, and breeding can only be carried on when there is pollen in the hive.

We see then that our honey bees are not dormant in winter, but that, in our colder climates they are Othello-like, and with their occupation gone; and shut in by the rigor of the season, they only eat the small amount necessary to the bated activity of their bodily functions.

PSYCHE.

CAMBRIDGE, MASS., MARCH 1881.

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PROCEEDINGS OF SOCIETIES.

CAMBRIDGE ENTOMOLOGICAL CLUB.

10 DEC. 1880. — 72nd meeting. Mr. S: H. Scudder called attention to a recent paper by Dr. F. Eugen Geinitz ("Die Blattineen aus der Dyas von Weissig") being a new and extensive description of a very complete fossil cockroach. Especial attention was called to the want of symmetry in the venation of the wings. Mr. Scudder then exhibited a drawing of a new (undescribed) cockroach recently found at Mazon Creek, Ill., which was even more complete than the one studied by Geinitz. This specimen also shows conspicuous difference in the venation of the wings of both pairs.

Mr. Scudder also called attention to another paper by Dr. Geinitz, which was, he said, the first considerable paper that had hitherto appeared, so far as he knew, on fossil insects of the Lyas of Germany. . . . Dr. E: L. Mark gave a synopsis of the results already arrived at by Dr. Manson (of Amoy). Lewis (of Calcutta), and others concerning the history of the parasite of the human blood known as *Filaria sanguis-hominis*, and the probability of a certain mosquito (*Culex*) being the intermediary host which harbors the worm in certain stages of its development. The figures accompanying the papers by Drs. Manson and Lewis were exhibited. Mr. W: Trelease referred to Mr. H: C. McCook's report printed on p. 183 of Prof. Comstock's "Report upon Cotton Insects." Mr. Trelease could not quite agree with Mr. McCook in attributing so insignificant an importance to the ants. He (Trelease) had repeatedly lost in a single night the contents of boxes holding a dozen or more larvae of *Aletia* from the invasion of the ants in question. Mr. T. is now quite sure that the moths (*Aletia*) seek the extra-floral glands on the peduncle of the sweet potato plant [*Ipomoea batatas*] for food. He did not state the fact in his report to Prof. Comstock because at that time he was not quite sure that such was the case.

HOMOLOGIES OF THE CREMASTER.

In the *Comptes Rendus* for 16 Aug. 1880, Künckel homologizes the whole cremaster of the butterfly chrysalis with the anal prolegs of the caterpillar; the cremaster is formed, he says, by the soldering of a pair of appendages, bearing at tip, each independently of the other, a series of hooks; and these two parts can be seen, in a changing chrysalis, to be hidden under the skin of the anal legs of the caterpillar. Riley however has clearly shown (*Amer. entom.*, July 1880, v. 3, p. 162–167) that the body of the cremaster of the chrysalis corresponds to the anal plate (or terminal segment) of the caterpillar, and that the anal prolegs of the latter are transformed to what he terms the sustentors, ridges on the under surface of the cremaster which terminate anteriorly in little knobs, and play such an important part in the pupation of nymphalidous butterflies. Künckel has evidently been led astray in part by the mere resemblance between the hooks of the pupal cremaster and those of the larval prolegs; and what becomes of the anal plate of the caterpillar he fails to tell us. Both these authors have written independently. *S: H. S.*

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [ ], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

Corrections of errors and notices of omissions are solicited.

Edwards, H: [Prospectus of "Papilio. Organ of the New York entomological club."] (Papilio, 15 [20] Jan. 1881, no. 1, v. 1, p. 1.)

This journal will be devoted solely to lepidoptera, and will be issued about the fifteenth of each month (except July and August); subscription price two dollars per annum. *B: P. M.* (2169)

Grote, A: Radcliffe. A new insect injurious to the hickory. (Papilio, 19 Feb. 1881, no. 2, v. 1, p. 13–14.)

Describes *acrobasis caryae* n. sp., larva, imago and chrysalis (Ohio) and *a. demotella* (N. Y.); compares *a. caryae* with *a. angusella*. States that it is necessary to have both sexes of this genus for identification. *A. caryae* said to be very destructive to hickory trees (*carya porcina*); *phanerotoma tibialis* parasitic on it. *H: E.* (2170)

Grote, A: Radcliffe. New *pyralidae*. (Papilio, 19 Feb. 1881, no. 2, v. 1, p. 15–19.)

Describes as new: *cataclysta medicinalis* (Ill.), *hydrocampa pacalis* (N. Y.), *paraponyx plenilinealis* (Wisc.), *oligostigma obscuralis* (Wisc.), *toripalpus trabalis* (Col.), *nephopteryx scintillans* (Cal.). Gives list of species of *cataclysta*, and notices some species of *hydrocampa*. *H: E.* (2171)

Grote, A: Radcliffe. The North American species of *eustrotia*. (Papilio, 15 [20] Jan. 1881, no. 1, v. 1, p. 10.)

Gives list of the N. A. species; defends the name *eustrotia* in preference to *erastria;* compares *eustrotia* with *thalpochares;* describes *eustrotia aeria* n. sp. (Wisc.). *H: E.* (2172)

Grote, A: Radcliffe. "North American *tortricidae*." By Lord Walsingham, London, 1879. (Papilio, 15 [20] Jan. 1881, no. 1, v. 1, p. 8–9.)

Review of T: de Grey's (*Lord Walsingham*) "Illustrations of typical specimens of *lepidoptera heterocera* . . ." [Rec., 1942]. *H: E.* (2173)

Lintner, Joseph Albert. On the importance of entomological studies. [Papilio, 15 [20] Jan. 1881, no. 1, v. 1, p. 1–2.)

Extracts from an address recently made to the Farmers' Club of Onondaga Co., N. Y. Alludes to the introduction of destructive species. *H: E.* (2174)

Müller, Hermann. Alpenblumen, ihre Befruchtung durch Insekten und ihre Anpassungen an dieselben. Mit 173 Abbildungen in Holzschnitt. Leipzig, Wilh. Engelmann, 1881. 612 p., 23×15.

Considers the mode of fertilization of 422 phaenogamous species, enumerating the insects taken upon each and their behavior. Discusses the structural peculiarities through which certain flowers profit by the visits of certain groups of insects, and the structures of the latter which are correlated with their floral activity. Gives tables showing the relative frequency of the different groups of insects about flowers in alpine and less elevated regions, and a classified list of all insects observed on the former, indicating the species which they visit, and the degree of adaptation found in these flowers. *W: T.* (2175)

Neumoegen, Berthold. A new species of *arctia*, from Colorado. (Papilio, 19 Feb. 1881, no. 2, v. 1, p. 28–29.)

Describes *arctia determinata* from southern Colorado. *H: E.* (2176)

Neumoegen, Berthold. On a new species of *arctia* from Florida. (Papilio, 15 [20] Jan. 1881, no. 1, v. 1, p. 9–10.)

Describes *arctia flammea*, from Indian River, Fla. *H: E.* (2177)

Neumoegen, Berthold. The illustration of *edwardsia brillians*. (Papilio, no. 1, v. 1, p. 12, pl. 1.)

Colored figure of this zygaenid moth, first described in Can. entom., Apr. 1880, v. 12, p. 67-69. *H: E.* (2178)

Scudder, S: Hubbard. Catalogue of scientific serials of all countries, including transactions of learned societies in the natural, physical and mathematical sciences, 1633–1876. (Library of Harvard university, special publications, 1.) Cambridge, [pub. by the Library], 1879. 12+158 p., 25×16, cl., $4; printed on one side of leaf, $5.

Notice. (Title-slip registry, Oct. [Nov.] 1879, v. 1, no. 10, p. 90.)

Countries geographically arranged, towns alphabetically under countries, societies and independent publications alphabetically under towns, transactions under societies. Contains ample cross-references, indexes of towns, of titles, and of minor topics. Numeros nearly 4500, entries about 6000; about 137 entomological titles. *B: P. M.* (2179)

Scudder, S: Hubbard. Ocelli in butterflies. (Amer. nat., Aug. 1873, v. 7, p. 490.)

The males of *lerema*, *accius* and *l. pattenii* have a single ocellus in the middle of the front. [*See* Rec., S.] *G: D.* (2180)

Scudder, S: Hubbard. Problems in entomology. (Can. entom., Sept. 1880, v. 12, p. 161-167.)

Retiring President's address, delivered 24 Aug. 1880, before the Entomological club of the A. A. A. S. Brief historical notice of the study of entomology about Boston, Mass.; appeal to entomologists to study the comparative anatomy, embryology, post-embryological development, habits, structure of wings and structure of mouth-parts of insects. *G: D.* (2181)

Shell-lac cultivation in India. (Colonies and India, 28 Aug. 1880, p. 11, 13 cm.)

Mode of preparing shell-lac and of transferring the lac-insect [*coccus lacca*] from one tree to another. *G: D.* (2182)

Shimer, H: Butterflies in midwinter. (Science news, 1 Mar. 1879, v. 1, p. 143.)

Colias philodice? and *vanessa antiopa?* on the wing, 20 Dec. 1877, at Mt. Carroll, Ill. *S: H.* (2183)

Shortt, J: An account of the *sclerotium stipitatum* B. & Curr., of Southern India. (Journ., Linn. soc., Bot., 1 Nov. 1866, v. 9, p. 417–419.)

Considers the nature, distribution and uses of the fungus of white ant hills. *W: T.* (2184)

Siewers, C: Godfrey. Mold as an insect destroyer. (Amer. nat., Nov. 1879, v. 13, p. 681-683.)

Separate, [Phil., 1879]. p. 681-683, 23×15, t 18×10.2.

Effect of fungi in destroying insects. *B: P. M.* (2185)

Smith, *Miss* Emily Adella. Shade trees, indigenous shrubs and vines, by J. T. Stewart, *M.D.*, and Insects that infest them, by *Miss* Emily A. Smith. Peoria, Ill., 1877. t.-p. cover, 55 p., il. 22×14, t 17×9.7.

The entomological part (p. 29-55) describes, in a popular way, *psylla celtides-mamma*, *pemphigus ulmicola*, *eriosoma ulmi*, *vanessa antiopa*, *tremex columba*, *datana ministra*, *stenocorus putator*, *lecanium acericola*, *ornix acerifoliella*, *aegeria acerni*, *clisiocampa americana*, *pemphigus vagabundus*, *acronycta populi*, *clytus robiniae*, *xyleutus robiniae*, *hyphantria textor*, *clisiocampa sylvatica*, *attacus promethea*, *hylurgus terebrans*, and *curculio pales*, some of which are figured. *G: D.* (2186)

Smith, *Mrs.* Erminnie A. Concerning amber. (Amer. nat., March 1880, v. 14, p. 179-190.)

Alludes to insects in amber, and quotes verses upon that subject. *G: D.* (2187)

Sograff, N. Vorläufige Mittheilungen . . . [Rec., 1698].

Notice, by Alex. Brandt. (Zool. Anzeiger, 22 March 1880, jahrg. 3, p. 138.) *G: D.* (2188)

Sources and preparation of shellac. (New remedies, June 1880, v. 9, p. 177, 27 cm.)

Propagation of *coccus lacca* and preparation of shellac and lac dye. From Valentine Ball's "Jungle life in India, ..." *G: D.* (2189)

Strecker, Herman. Butterflies and moths in their connection with agriculture and horticulture. A paper prepared for the Pennsylvania fruit growers' society, January, 1879. Harrisburg, 1879. 22 p., 24×16.

Entitled, on p. 3, "Butterflies and moths of North America, in their relation to horticulture and floriculture." Universality of the attacks of lepidoptera upon plants; food-plants of numerous species; insectivorous plants; useful insects; peculiar caterpillars; mimicry; monstrosities; geographical distribution; American entomologists. *B: P. M.* (2190)

Strecker, Herman. Wintering of butterflies. (Science news, 1 Mar. 1879, v. 1, p. 160.)

Vanessa antiopa and *v. progne* hibernate; *philampelus labruscae* captured, 8 Jan. 1874, at Fairbury, Ill. *S: H.* (2191)

Swinton, A. H. Notes on certain fossil orthoptera claiming affinity with the genus *gryllacris*. (Geol. mag., 1874, s. 2, v. 1, p. 337–341, pl. 1.)

Figures and describes *gryllacris* (recent species), *g. ungeri* (restored) and *corydalis brogniartii* (Audouin). *J. M. W.* (2192)

Taschenberg, E. L. Wandtafel zur Darstellung des Colorado-Kartoffelkäfers und seiner Entwickelungsstufen. Mit erklärendem Texte für Schule und Haus. Stuttgart, E. Ulmer, [1877]. 1 pl., 56×71, folded in a cover 30×25, and accompanied by

Der Colorado-Kartoffelkäfer. Erläuternder Text zu der "Wandtafel zur Darstellung [etc]." Stuttgart, E. Ulmer, 1877. 12 p., 21×14.5, t 17×10.5.

Colored figures with description of egg, larva, pupa and imago of *doryphora decemlineata*. *G: D.* (2193)

Tepper, F: *Cerura multiscripta* Riley. (Bull. Brooklyn entom. soc., May 1878 [v. 1], p. 4.)

Larvae found on "upright willow" [*salix* sp?] 30 July. *F. G: S.* (2194)

Tepper, F: Notes on *notodonta tremula*, Clerk, *n. dictaeoides* Esp. and *n. rimosa* Pack. (Bull. Brooklyn entom. soc., May 1879, v. 2, p. 3–4.)

With woodcuts of the larvae of the two first-named species. *F. G: S.* (2195)

Todd, James E. Contrivances for cross-fertilization in the *ranunculaceae*. (Amer. nat., Sept. 1880, v. 14, p. 668–669.)

Chiefly botanical. *G: D.* (2196)

Travers, H: H. Notes on the Chatham Islands. (Journ. Linn. soc., Bot., 3 Nov. 1864, v. 9, p. 135–144.)

Records, p. 144, the insects he recognized; also the fact that since the importation of bees European fruit trees have produced freely. *W: T.* (2197)

Treat, Mary. Chapter in the history of ants. (Harper's new mo. mag., Jan. 1879, v. 58, p. 176–184.)

Reprint. (TREAT, Mary. Chapters on ants. N. Y., 1879. p. 11–72.)

Habits of *formica sanguinea*, the slave making ant; of its slaves, *f. fusca* and *f. schaufussii;* and of insects captured by it for food, *lasius flavus*, *camponotus meleus* and *aphaenogaster treati*. *B: P. M.* (2198)

Treat, Mary. Chapters on ants. N. Y., Harper and Bros., 1879. (Harper's half-hour ser., no. 123.) t.-p. cover, p. 5–96, 12 × 8, t 9×5.7. il. pap., 20 cts.

Rev. (Amer. bookseller, 1 Sept. 1879, v. 8, p. 174, 3 cm.)

Chap. 1 (p. 11–72) is a reprint of the author's "Chapter in the history of ants" (Harper's new mo. mag., Jan. 1879, v. 58, p. 176–184) [Rec., 2198]; chap. 2 (p. 72–96) is a reprint of the author's "The harvesting ants of Florida" (Lippincott's mag., Nov. 1878, no. 131, v. 22, p. 555–562) [Rec., 2200]. *B: P. M.* (2199)

Treat, Mary. The harvesting ants of Florida. (Lippincott's mag., Nov. 1878, no. 131, v. 22, p. 555–562.)

Reprint. (TREAT, Mary. Chapters on ants. N. Y., 1879. p. 72–96.)

Habits of *pogonomyrmex crudelis;* its harvesting of seeds, its recognition of comrades; theories as to soldiers and queens with smooth mandibles. *G: D.* (2200)

Treat, Mary. Is the valve of *utricularia* sensitive? (Harper's new m. mag., Feb. 1876, no. 309, v. 52, p. 382–387. il.)

"Shows how the mosquito [*culex*] and *chironomus* larvae are caught in the utricles, which proves Mr. Darwin in error with regard to the sensitiveness of the valve of *utricularia*."—*Author.* *B: P. M.* (2201)

Trelease, W: The fertilization of *aquilegia vulgaris*. (Amer. nat., Oct. 1880, v. 14, p. 731–733.)

How *bombus* fertilizes *a. vulgaris*. *G: D.* (2202)

Turner, H: Ward. The *belostoma* piscivor[o]us. (Amer. nat., Sep. 1879, v. 13, p. 585.)

A *belostoma* seen killing a stickle-back [*gasterosteus*]. *G: D.* (2203)

[**United States entomological commission.**] (Amer. nat., Oct. 1880, v. 14, p. 753–755.)

Organization, distribution of the work, and results of investigations of the commission in regard to *caloptenus spretus*. *G: D.* (2204)

[**United States entomological commission**, Work of the.] (Amer. nat., Jan. 1879, v. 13, p. 60–61.)

Extract from the Report of the U. S. Secretary of the interior, for 1878. *G: D.* (2205)

United States — *Entomological commission.* Bulletin no. 3. The cotton worm [*aletia argillacea*]. Summary of its natural history, with an account of its enemies, and the best means of controlling it; being a report of progress of the work of the commission. . . . By Chas. V. Riley, Wash., Jan. 28, 1880. t.-p. cover+6+[1]+144 p., 1 col. pl., 23×15, 84 fig.

Rev. (Nature, 18 Mar. 1880, v. 21, p. 446.)

Rev., entitled, "Riley on the cotton worm." (Amer. nat., April 1880, v. 14, p. 283-284.)

Notice. (College quart., May 1880, v. 3, no. 1, p. 14, col. 2.)

History of prior investigations; destructiveness, nomenclature, descriptions and figures of all stages, seasons, migration, hibernation, natural enemies and parasites of *aletia argillacea;* influence of weather and environment upon its appearance and development; artificial means against it: prevention, mechanical destruction, poisoning of larvae, destruction of imagos. Appendix, containing answers to Circular no. 7. Index. Describes larvae of *plusia dyaus* (p. 11), *aspila virescens* (p. 25), *platyhypena scabra* (p. 27); describes also *trichogramma pretiosa* (p. 39), *tachina aletiae* (p. 40-41), *sarcophaga sarraceniae* (larva and puparium, p. 41; imago in part, p. 39-40), *belvoisia bifasciata* (larva, p. 42), *cirrospilus esurus* (p. 43). *chalcis ovata* (larva and pupa, p. 43), *didictyum* n.g. [*proctotrupidae*], *d. zigzag* n. sp. (p. 44), *pimpla conquisitor* (larva and pupa, p. 45), *cryptus nuncius;* figures of many of these and other insects. *B: P. M.* (2206)

United States— *Entomological commission.* Bulletin no. 4. The hessian fly [*cecidomyia destructor*], its ravages, habits, enemies, and means of preventing its increase. By A. S. Packard, *jr.*, *M. D.* Wash., May 20, 1880. t.-p. cover, 43 p., 2 pl., each pl. with 1 p. explanation, t 19×11.2; 1 map, t 20.5×26.7; 23×15.

Rev. and extract, entitled "The hessian fly." (Amer. nat., Aug. 1880, v. 14, p. 586-587.)

Statement of the present knowledge upon the subjects indicated by the title, intended to elicit further information. Describes and figures the fly in all its stages, treats of the times and places of its occurrence in injurious abundance, and contains a list of the most important published writings relating to the fly. *G: D.* (2207)

United States — *Entomological commission.* Bulletin no. 5. The chinch-bug [*blissus leucopterus*]. Its history, characters, and habits, and the means of destroying it or counteracting its injuries. By Cyrus Thomas. Wash., 1879. t.-p. cover + 44 p., 23 × 15, t 19×11.2; map, 23×31; 10 fig.

Notice. (College quart. [Ames, Iowa], May 1880, v. 3, no. 1, p. 14, col. 2.)

Rev., entitled "Thomas's Chinch bug." (Amer. nat., July 1880, v. 14, p. 511.)

Distribution and ravages, civil history, names and description, number of broods, hibernation, migrations, and natural enemies of *blissus leucopterus;* artificial means against it: early sowing, barricading, burning, starving, crushing, and other means. *B: P. M.* (2208)

United States — *Geological and geographical survey of the territories.* Bulletin, 1874 and 1875. Vol. 1. Wash., 1875. t.-p. covers+13+28+77+499 p., pl. 1-3, 7, 8, 11-26, 23×15, t 18.8×11.1; pl. [4], 23×31; pl. [5], 23×57; pl. [6] 23×88; pl. 9, 23×81; pl. 10, 23×80; map, 61×77.

The pages, dates, and entomological contents are as follows:—

[s. 1], no. 1. 1874. half t.-p.+28 p. — List of members and collaborators of the survey for 1873 [Rec. 564 *a*], p. 3-4.—List of the publications of the Geological survey of the territories [Rec., 564 *b*], p. 5-6.

[s. 1], no. 2, 1874. half t.-p.+77 p.—Thomas, C. Descriptions of some new orthoptera . . . [Rec., 565], p. 63-71.

s. 2, no. 1. 1875. p. 1-48, pl. 1-3.

s. 2, no. 2. 14 May 1875. p. 49-142.—Ingersoll, E. Report on the natural history . . . [Rec., 566], p. 121-124.

s. 2, no. 3. 15 May 1875. p. 143-214, pl. [4-6], 7-8.

s. 2, no. 4. 10 June 1875. p. 215-232, pl. 9-18.—Scudder, S: H. The tertiary *physopoda* of Colorado [Rec., 567], p. 221-223.

s. 2, no. 5. 8 Jan. 1876. [1 p.]+p. 233-414, pl. 19-21.—Uhler, P. R. List of hemiptera of the region west of the Mississippi River . . . [Rec., 568], p. 267-361, pl. 19-21.

s. 2, no. 6. 8 Feb. 1876. p. 415-499+13 p., pl. 22-26.—Scudder, S: H. Fossil orthoptera from the Rocky Mountain tertiaries [Rec., 569], p. 447-449.
B: P. M. (2209)

United States—*Geological and geographical survey of the territories.* Bulletin, 1876. Vol. 2. Wash., 1876. t.-p. covers+12+392 p., pl. 1-31, 42-49, 1-6 [42-47], 23×15, t 18.8×11.1; pl. 1-6 [32-37], 8–10 [39-41], 23×52; pl. 7 [38], 23×61; maps, 44×71, 55×72.

The pages, dates, and entomological contents are as follows:—

no. 1. 21 Mar. 1876. p. 1-88, pl. 1-29, map.—Scudder, S: H. Fossil coleoptera from the Rocky Mountain tertiaries [Rec., 570], p. 77-87.

no. 2. 1 Apr. 1876. p. 89-195+, pl. 30-31.

no. 3. 5 June 1876. p. 197-278, pl. 1-10 [32-41], map.—Scudder, S: H. Brief synopsis of North American earwigs . . . (Rec., 571], p. 249-260.—Scudder, S: H. List of the orthoptera collected . . . [Rec., 572], p. 261-267.—Scudder, S: H. Notice of a small collection of butterflies . . . [Rec., 573], p. 269-270.

no. 4. 4 Aug. 1876. [1 p.]+p. 279-392+12 p., pl. 42-49, 1-6 [42–47]. *B: P. M.* (2210)

United States— *Geological and geographical survey of the territories.* Bulletin. 1877. Vol. 3. Wash., 1877. t.-p. covers+8+856+p., pl. 2-25, 27-34, 36, 23×15, t 18.8×11.1; pl. 1, 41×38; pl. 26. 35×46; pl. 35, 23×30; pl. 37, 23×24; pl. 38, 23×62; pl. 39, 33×52.

The pages, dates, and entomological contents are as follows:—

no. 1. 5 Apr. 1877. p. 1-185, pl. 1-26.—Grote, A: R. Notes on a collection of noctuid moths made in Colorado . . . [Rec., 850], p. 115-120.—Chambers, V. T. The *tineina* of Colorado [Rec., 851], p. 121-142.—Chambers, V. T. Notes on a collection of tineid moths made in Colorado . . . [Rec., 852], p. 143-145.—Chambers, V. T. On the distribution of *tineina* in Colorado [Rec., 853], p. 147-150.—Packard, A. S., *jr.* On a new cave fauna in Utah [Rec., 854], p. 157-169.

no. 2. 30 Apr. 1877. p. 187-530, pl. 27-28.—Osten Sacken, C: R. Western diptera . . . [Rec., 855], p. 189-354.—Uhler, P. R. Report upon the insects collected by P. R. Uhler during the explorations of 1875 . . . [Rec., 856], p. 355-475, pl. 27-28 [concl., no. 4, p. 765-801].—Thorell, T. Descriptions of the *araneae* collected in Colorado . . . [Rec., 857], p. 477-528.—Emerton, J. H: Descriptions of two new spiders from Colorado [Rec., 858], p. 528-529.

no. 3. 15 May 1877. p. 531-738, pl. 29-39.

no. 4. 15 Aug. 1877. p. 739-856+8+p.—Scudder, S: H. The first discovered traces of fossil insects in the American tertiaries [Rec., 859], p. 741-762.—Scudder, S: H. Description of two species of *carabidae* found in the interglacial deposits of Scarboro' Heights, near Toronto, Canada [Rec., 860], p. 763–764.—Uhler, P. R. Report [etc.] [*see* no. 2, p. 355–475; Rec. 856], p. 765–801.
B: P. M. (2211)

Vayssière, Alb. Sur la métamorphose du *prosopistoma*. Note . . . . (Compt. rend., 7 June 1880, v. 90, no. 23, p. 1370-1371.)

Records the transformation of *prosopistoma punctifrons* into images resembling *caenis*, proving that *prosopistoma* is an ephemerid nymph. *B: P. M.* (2212)

Viallanes, H. Sur l'appareil respiratoire et circulatoire de quelques larves de diptères. (Comptes rendus de l'Acad. des sci., 17 May 1880, v. 90, p. 1180–1182.)

In the young larvae of *ctenophora*, the dorsal vessel is a long, contractile tube open only at its two extremities. It consists of a homogeneous substance containing nuclei themselves contractile, and its anterior portion floats freely in the bloody fluid; the posterior portion, on the contrary, is clothed with a layer of continually budding cells which become attached by protoplasmic prolongations to the walls of the body and form the primitive pericardiac sinus; the place where the lateral orifices of the dorsal vessel are going to be formed is indicated by a region of more energetic contractions. The last segment is entirely filled with tracheal tufts which interlace behind so as to form a sort of sieve behind the orifice of the dorsal vessel. Hence the blood is entirely oxidized as it passes through the last segment, and before the appearance of the lateral orifices the heart is entirely arterial. *A. R.* ———

"To recapitulate, I have shown; 1° that the heart of insects is, at first, a simple tube, open only at its two extremities; 2° that, so long as there are no lateral orifices, the heart is entirely arterial; 3° I have indicated the mode of formation of the lateral orifices and of the pericardial sinus." *G: D.* (2213)

Vorce, C. M. Destructive powers of certain insects. (Amer. nat., Oct. 1879, v. 13, p. 663.)

Mentions paper read by above author on this subject before the American society of microscopists in Buffalo.
R. Th. (2214)

Walsingham, *Lord, see* de Grey, T:, *Lord Walsingham.*

Weale. J. P. Mansel. Notes on the structure and fertilization of the genus *bonatea*, with a special description of a species found at Bedford, South Africa. (Journ. Linn. soc., Bot., 7 Mar. 1867, v. 10, p. 470-476.)

Describes the curious way in which lepidoptera transfer pollen. *W: T.* (2215)

ENTOMOLOGICAL ITEMS.

THE CONSERVATOR of forests [in South Australia] reports that sugar and gum stand the ravages of the white ants better than other timber. — *Colonies and India*, 4 Dec. 1880.

DR. WILLIAM MARSHALL will give a course of lectures on the natural history of insects, in Leipzig University, during the summer semester. The lectures will be on Monday, Wednesday and Friday, and every two weeks, on Saturday, an excursion, for collecting purposes, will be had.

ACCORDING TO the president's report of Harvard University for 1879–1880, Mr. Edward Burgess, who generously gave his services as instructor of entomology in the Bussey Institution during the academic year 1879–1880, will continue to give the school his services during the current year.

THE ENTOMOLOGICAL Club of the American Association for the Advancement of Science was formed last year into the Entomological Subsection of Section B of the A. A. A. S., and will therefore hold no separate meetings hereafter. It will meet with the Association, at Cincinnati, Ohio, on Wednesday, 17 Aug. 1881, at 10 A. M. All persons interested are invited to attend its meetings and participate in its discussions.

JNO. G. MORRIS, *President.*
B: PICKMAN MANN, *Secretary.*

PHILIBERT F. VON OUGSPURGER, the Swiss coleopterist, who died 5 Nov. 1880, left his valuable collection, and many accurately colored figures, work of his own hand, to the Museum of Natural History in Berne. The above-mentioned collection contains, in addition to many costly exotic species, a carefully labelled collection of coleoptera of the Bernese Alps. Mr. Albert Müller, who has charge of the entomological department in this fine museum, finished the past year in Berne, will gladly preserve, with his accustomed care, this important addition to its riches.

SOCIETY MEETINGS.

THE REGULAR meetings of the Cambridge Entomological Club will be held at 19 Follen St., at 7.45 p.m., on the days following: —

8 Oct. 1880.
12 Nov. "
10 Dec. "
14 Jan. 1881.
11 Feb. "
11 Mar. 1881.
8 Apr. "
13 May "
10 June "

B: PICKMAN MANN, *Secretary.*

THE REGULAR meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following:—

27 Oct. 1880.
24 Nov. "
22 Dec. "
26 Jan. 81.
23 Feb. 1881.
23 Mar. "
27 Apr. "
25 May "

B: PICKMAN MANN, *Secretary.*

THE REGULAR meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following: —

8 Oct., 1880.
12 Nov. "
10 Dec. "
14 Jan. 1881.
11 Feb. "
11 Mar. 1881.
8 Apr. "
13 May "
10 June "

JAMES H. RIDINGS, *Recorder.*

THE SEMI-ANNUAL meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following: —

13 Dec. 1880.
13 June 1881.

JAMES H. RIDINGS, *Rec. Sec'y.*

THE REGULAR monthly meetings of the Montreal Branch of the Entomological Society of Ontario will be held at Montreal, Que., Canada, on the days following: —

7 Sept. 1880.
5 Oct. "
2 Nov. "
7 Dec. "
4 Jan. 1881.
1 Feb. "
1 Mar. "
5 Apr. "

G: H. BOWLES, *Secretary.*

PRIZE ESSAYS.

DUE 15 OCT. 1882.— Life-histories of *Sclerostoma syngamus* and of *Strongilus pergracilis*. See PSYCHE, v. 3, p. 59.

ADVERTISEMENTS should reach the editors by the 10th of the month preceding the one in which they are to appear.

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J. HENRY COMSTOCK,
Department of Agriculture,
Washington, D. C.

No. 82 was issued 14 July 1881.

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ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

[Established in 1874.]

EDITED BY

GEORGE DIMMOCK, *Cambridge, Mass.;* B: PICKMAN MANN, *Cambridge, Mass.;*
ALBERT J: COOK, *Lansing, Mich.;* CLIFFORD CHASE EATON, *Cambridge,*
Mass.; JOSEPH DUNCAN PUTNAM, *Davenport, Iowa;* FRANCIS
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APRIL 1881.

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PSYCHE.

SOME PSOCINA OF THE UNITED STATES.

BY HERMANN AUGUST HAGEN, CAMBRIDGE, MASS.

Genus CAECILIUS Curtis.

Subgenus PTERODELA Kolbe.

Tarsi two-jointed; claws with a tooth beneath before tip; no discoidal cell; the stem of the superior furcated vein as long as the inferior branch of the fork and incurved; posterior marginal cell free, elliptical; pterostigma free, with a hook on the interior inferior angle on the inner side; antennae shorter than wings.

C. pedicularius.

Linné, Fn. Suec., ed. 2, no: 1515.—*Psocus salicis* Hag., Neur. N. Am., 13, 15! *Ps. geologus* Walsh, Proc. Ac. N. Sc. Philad., 1862, p. 362!; Proc. Entom. Soc. Philad., 1863, p. 168, 184. (For the European synonymy: Hag., Psoc. synopsis synon., 1866; M'Lachlan, Monogr. Brit. Psocidae, p. 17; Kolbe, Monogr., 1880, p. 118.)

Very small, brown, shining; antennae a little shorter than wings, darker, pilose; head with an impression between anterior ocellus and clypeus; clypeus brown, shining; slightly pilose; palpi brown; eyes with globular facets; abdomen brown; legs darker on knees and tarsi; wings hyaline, veins dark brown; pterostigma oblong, broader on tip, with the inferior exterior angle rounded, and a black hook beneath on the interior angle; anal vein with a very small black dot on tip; posterior marginal cell broadly elliptical; male genitals above with two small downwardly bent horny hooks, and beneath with two larger sharp upwardly bent hooks.

Length to tip of wings $1\frac{1}{2}$ to $1\frac{3}{4}$ mm.; expanse of anterior wings 3 to $3\frac{1}{2}$ mm. Hab. Massachusetts, Hagen; New York, A. Fitch; Illinois, Rock Island, Walsh; Missouri, St. Louis, bred by Mr. Riley; New Hampshire, Berlin Falls, August 12; Cuba, Hag. The species is common in houses in Cambridge, and common everywhere in the northern and middle parts of Europe.

I compared the types of A. Fitch (*Ps. salicis*), of Walsh (*Ps. geologus*), and of Riley; they are identical. Walsh's specimens are badly gummed on paper; probably the difference in the shape of the pterostigma is the consequence, as the two sides of the wings are very loosely connected in the *psocina*, and therefore the venation easily altered by pasting the wings on paper. One of Walsh's types has the pterostigma triangular, and rounded posteriorly as described by him, the other type has the pterostigma identical with *C. pedicularius*. I have observed variation of the veins in other specimens, but till now no variation of the pterostigma. The specimens from A. Fitch, Riley, and Walsh, and from Berlin Falls, are the smallest, those in the houses in Cambridge and from Cuba have just the average size of the European ones, but I possess also from Europe nearly as small ones as the small American specimens. I am not able to find any difference between the American and European specimens.

Mr. Riley has bred three specimens from a little bounding leafgall of globular shape, 1 mm. in diameter, shorter than broad; a small round opening was eaten out, and inside of the gall was a crushed membrane. The fact of a *Psocus* being raised from galls is very long published, but always overlooked. Linné, Fn. Suec., ed. 1, 1746, described, no: 941, one species as *Tenthredo*, and in ed. 2, no: 1532, the same as *Cynips salicis strobili*. Professor Zaddach and I have raised apparently the same species from willow galls belonging to *Teras terminalis*. The *Psocus* is only an inquiline and proved to be *C. pedicularius*. The description of *Ps. pusillus*, Harris Corresp., p. 331, differs from *C. pedicularius;* the size is the same. As the description was made from the living insect, the identity is not impossible.

C. pedicularius is an aberrant species in the genus, being the only one known to me with a tooth before the tip of the claws; if the tarsi were three-jointed it could scarcely be separated from *Elipsocus*. All species of *Caecilius* known to me, or rather all till now examined, living or fossil, do not possess teeth on the claws.

The claws of many *psocina* and also of *C. pedicularius* possess a very curious structure. The basis of the claw is somewhat enlarged below in the manner of a blunt projection with what appear to be two strong bristles, that nearer to the basis shorter and thinner than the other one, which is often as long as or longer than the claw, more or less bent and incurved, and thicker on tip. This last one is, as I was able to make out by the microscope, no bristle at all, but a kind of hose open on tip and seemingly finely striated. If the hose is not dilated it imitates a bristle, and the thicker tip is formed by the closed mouth of the hose. If dilated it forms a kind of long funnel, the mouth a little larger, circular and as it seems evaginated. In a few cases I was able to observe in the interior of the funnel a large number of very fine threads ending in a little knob. I was able to see this hose more or less well in amber species and among living ones in *C. pedicularius*, *C. lasiopterus*, and *Elipsocus westwoodii*. I did not observe it in *atropina* (*Empheria* excepted) nor in *Psocus sensu strictiori*, except in the amber species *Ps. affinis*, but my observations are not yet finished. To see the structure of the hose well a very strong immersion power is needed. I have no explanation of the use of it, and know of no similar structure in other insects. The tarsi of *Thrips* are the only ones to be compared with it, nevertheless they are very different. As *psocina* need no suckers to fix them to the spot, I am at a loss to understand its use. I may state that teeth on the claws of the *psocina* are very common; *Atropos* has two and *Amphientomum* five on each claw. Several genera show a comb on the last joints of the tarsus. A series of tubercles formed by a kind of shield with five short spines have on top a longer and stronger spine, which forms the comb.

(*To be continued.*)

FOREIGN HONEY BEES.

BY ALBERT JOHN COOK, LANSING, MICH.

The Cyprian bees were first imported from Cyprus into Europe by Count Kolowrat of Hroby and Herr Cori of Bruex, Bohemia, and were pronounced by these and other experts in apiculture, as superior to both the German and Italian races. In the winter of 1879–80, Messrs. A. D. Jones, of Breton, Ontario, Canada, who has made a fortune as a bee keeper, and Frank Benton, a graduate of the Michigan Agricultural College, and one of the best-read bee keepers of the world (who reads regularly the agricultural periodicals of Germany, France, Italy and England, as well as those of our own country), set sail for Asia, that they might establish an apiary in Cyprus, and introduce the Cyprian and Syrian bees directly from their native habitats into America. Mr. Jones returned in mid-summer of 1880, with about three hundred colonies of Cyprian and Holy-Land bees, while Mr. Benton remained in Cyprus to superintend a large apiary at Larnaca, and ship queens from the island to Europe and America.

The bees, both from Cyprus and Syria, are, like the Italian race, banded with yellow, and seem more like the Italian bees than they do like the much more yellow Egyptian bee. In temperament and habits too they are much like the well known Italians.

Mr. Benton, who is a close, accurate student of science, thinks that the Cyprian bees were probably introduced from Palestine many years — possibly centuries — ago, and have developed, in their isolated island home, strong race peculiarities. He also believes that the Italians are the offspring of the Cyprians.

The Cyprian bees closely resemble the Italians, except that the workers are a little smaller, and more yellow on the ventral side of their abdomens. The drones and queens can hardly be distinguished from those of the Ligurian or Italian race, except that they are more uniform, which we should expect, owing to the close in and in breeding necessitated by the limited territory of the island. The common opinion of those who have tried these bees is, that they are more prolific and active than even the Italians. This is as we should expect, as "survival of the fittest" would work powerfully to improve bees on so restricted an area, and where the seasons are often, like that of 1880, exceedingly dry.

The workers of the Syrian race are very plainly banded, because of the gray fuzz on each ring, otherwise they closely resemble the Italians. The queens are very obviously banded with dark and yellow, and are remarkably uniform. The drones are dark, and covered with a heavy gray fuzz. They resemble our common black drones more than they do either those of the Italians or Cyprians.

These bees, natives of an arid barren region, have also felt the severe hand of competition, and really promise to be a very valuable acquisition to the apiaries of the United States.

Not content with the valuable service thus far rendered, Mr. Benton has, the present winter, visited Ceylon, Farther

India, the Philippine Islands, and Java, hoping to add still further to the valuable importations of exotic bees. He took Cyprian and Holy-Land bees along, in our improved hives, and left some at each place of landing. He has been received with marked favor by the several governmental authorities.

At Ceylon, Mr. Benton secured the diminutive *Apis indica*. The bodies of the workers are only 1 cm. long; the thorax is brown, the shield or crescent between the wings is large and yellow; the abdomen, beneath, is yellow, and above is beautifully banded throughout its entire length with brown and yellow. These bees are very little inclined to sting, and when they do sting the effect is slight, owing to the very small size of the sting.

The queens are very large compared with the workers, are of a dark copper color, and seem astonishingly prolific. I have received some of the comb from Mr. Benton. The small cells, less than one-half of a cm. in diameter, give a dainty appearance to the comb, which is very interesting.

These bees, from their small size, great beauty, amiable tempers, and the possibility that they can work on flowers inaccessible to our larger bees, will be received with no little eagerness by American apiarists.

At the time of Mr. Benton's last letter he had not yet succeeded in procuring the large *Apis dorsata*, which was the great attraction which led to this laborious and expensive journey. But he had learned where they were to be found on the island of Ceylon and in Java. These bees suspend their combs vertically to the limbs of trees, often for a distance of a metre or more. Great stories are told of the large amount of honey which these bees store, and now for the first time we shall not only get reliable information of their habits and value, but, if the undertaking is practicable, we shall have them imported to our own American apiaries. Surely it is something to be proud of, that it was left for American enterprise to first introduce these long coveted species into the civilized countries of the world.

A FRAGRANT BUTTERFLY.

BY MARY ESTHER MURTFELDT, KIRKWOOD, MO.

In a paper on Brazilian butterflies, read before the London Entomological Society, 5 June 1878, by Dr. Fritz Müller, great prominence is given to the odors of the male butterflies, which the author considers as an especial sexual attraction.

Some years before the publication of this paper, in spreading fresh males of *Callidryas eubule*, I had been struck with the delicate violet-like odor which was emitted, and which was retained, to some extent, for several days. I have repeatedly observed the same quality since and always in the males. The females are not in the smallest degree fragrant. This is the only species, common with us, which, so far as I am aware, possesses this attribute, and as it belongs to a genus mainly represented in South American species, it may be simply the inheritance of a characteristic of use to its congeners in the forests of Brazil and not of any especial service to it in its present habitat.

PSYCHE.

CAMBRIDGE, MASS., APRIL 1881.

Communications, exchanges and editors' copies should be addressed to EDITORS OF PSYCHE, *Cambridge, Mass. Communications for publication in* PSYCHE *must be properly authenticated, and no anonymous articles will be published.*

Editors and contributors are only responsible for the statements made in their own communications.

Works on subjects not related to entomology will not be reviewed in PSYCHE.

For rates of subscription and of advertising, see advertising columns.

GEORGE DOLE SMITH.

Born 4 Sept. 1833, in Biddeford, Maine.

Died 6 July 1880, in Cambridge, Mass.

Mr. Smith was by trade a watchmaker and jeweller. After carrying on his business in Maine, Virginia, Illinois, and Missouri, he entered the establishment of Palmer, Bachelder and Co., in Boston, Mass., where he acted as salesman in the watch department for about nineteen years, and was for the last thirteen years a member of the firm. By his kind manners, accommodating spirit and thorough knowledge of his business he won many friends and increased in no small degree the patronage of the establishment. But devoted as he was to the interests of the firm, his heart was elsewhere.

He was a member of the Cambridge Entomological Club, and of the Boston Society of Natural History, though not a frequent attendant upon the meetings of either society. He was an enthusiastic student of coleoptera and for more than twenty years gave all his leisure time to the collection, arrangement and study of these insects. Indeed, so assiduous was his devotion to his collection, that few persons had an opportunity of making his acquaintance out of business hours, unless they visited him in his studio. In his earlier years he established the foundation of his collection by his own exertions, but later, being unable to travel extensively, and finding rather barren fields in his vicinity, he resorted largely to purchase and exchange. His aim was to obtain both sexes of every species existing in North America, and, having ample means, he spared hardly any expense in pursuance of this purpose. Moreover, the liberality with which he granted the use of his cabinet to other students secured for him their good will and cooperation, and through them he received immense additions to his cabinet. So thoroughly had the field been explored for him that for a long time before his death he was rarely able to add any new species except the very minute ones, and possessed nearly all that were known as occurring in North America. The extent and wonderfully perfect state of preservation of his collection attracted the attention of the leading students of his specialty in the country, and from them he received many visits. It was his practice to relax and remount every specimen which he placed in his cabinet, and it is rare to find a limb or a joint missing, while all these parts are set in the attitudes of the living individuals. Very few specimens had ever been in alcohol, hence they possessed the brilliancy of life. The whole North American collection is most neatly labelled and arranged in more than two hundred boxes made in form of large octavo books, and covered with black cloth. These boxes are ranged upon shelves in cabinets with glass doors.

In addition to his North American collection Mr. Smith had a quite extensive collection of South American coleoptera, mostly donations from various friends. He had spent much labor upon the arrangement of these in about forty wooden storing boxes, and except by comparison this collection in itself would be considered a monument of industry and devotion.

Mr. Smith was not simply a collector of insects. He possessed a very good entomological library, and was well read in the science. He owned also a fine and well-equipped binocular microscope, and was contemplating the performance of extensive work with this instrument when death put a stop to all his plans. — [Abstract of a memoir read by J: Orne, jr., before the Boston Society of Natural History.] *B: P. M.*

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

Corrections of errors and notices of omissions are solicited.

Bacon, Austin. Insects destroyed by vegetables. (Bulletin Torrey bot. club, Dec. 1874, v. 5, p. 51-52, 6 cm.)

Mentions the occasional inability of *urocerata* to extricate their ovipositors from trees which they were boring; the capture of insects in the closing flowers of *nymphaea odorata*, and their destruction when the latter were drawn under water for the maturity of their fruit; and the occasional inability of gall insects and the apple borer to escape from their host plants. *W: T.* (2216)

Bailey, W: Whitman. *Apocynum.* (Bull. Torrey bot. club, Feb. 1874, v. 5, p. 9-10, 12 cm.)

Records the capture of small coleoptera by the flowers, and quotes a passage from Dr. Darwin's "Loves of the flowers" concerning the similar capture of diptera. *W: T.* (2217)

Bailey, W: Whitman. Bees on *gerardia pedicularia*, L. (Bull. Torrey bot. club, Oct. 1871, v. 2, p. 39, 8 cm.)

Humble bees [*bombus*] observed collecting nectar exclusively through perforations in the corolla. *W: T.* (2218)

Bailey, W: Whitman. Perforation of *gerardia pedicularia* by bees. (Amer. nat., Nov. 1873, v. 7, p. 689-690, 22 cm.)

Finds that humble bees [*bombus*] visit the flowers but do not enter them from the mouth, obtaining nectar through perforations near the base of the corolla, which, however, he has never seen the bees make. *W: T.* (2219)

Basket worm (The). A new and dangerous enemy to the hedges and evergreens hereabout. From the New York sun. (Kansas City [Kans.] journal, 12 Aug. 1880, p. 15, col. 1, 43 cm.)

Brief life-history of *thyridopteryx ephemeraeformis* and other notes upon this species, mostly by A. S. Fuller. *G: D.* (2220)

Bassett, Homer Franklin. Description of a new species of *cynips*. *Cynips q. rileyi*, n. sp. (Amer. nat. Feb. 1881, v. 15, p. 149-150.) (Separate [General notes; entomology], from Amer. nat., Feb. 1881, p. 149-150.)

Description of the species and of its galls on *quercus castanea*. *G: D.* (2221)

Beal, W. J. Agency of insects in fertilizing plants. (Amer. nat., 1867, v. 1, July, p. 254-260; Oct., p. 403-408.)

Describes the fertilization of *campanula, taraxacum, amorpha, lupinus, oenothera, digitalis, kalmia, andromeda* and *iris* by various insects. *W: T.* (2222)

Bee-farm in New South Wales (A). (Colonies and India, 30 Oct. 1880, p. 10-11, 14 cm.)

Notes on the bee-farm of W: Dunn, of Sidney. *G: D.* (2223)

Bell, James Thompson. Arboreal auscultation. (Can. entom., Jan. 1881, v. 13, p. 19-20.)

From observation of woodpeckers [*picus*] at work, the author thinks that the exact location of a "borer" in a tree can be determined with an instrument similar to a stethoscope or to an ear-trumpet, and the grub then killed by piercing with an awl. *G: D.* (2224)

Bergroth, E. Die zwölfte skandinavische Naturforscher-Versammlung. (Entom. Nachrichten, 15 Nov. 1880, jahrg. 6, p. 256-257.)

Notice of the meeting of 7-14 July 1880, and list of 16 entomological papers read. *G: D.* (2225)

Bethune, C: James Stewart, *ed.*, *see* CANADIAN ENTOMOLOGIST.

[**Bibliography** of economic entomology.] (Amer. nat., Jan. 1881, v. 15, p. 84.) (Psyche, Nov. 1880 [Mar. 1881], v. 3, p. 143.)

Preliminary notices of a proposed bibliography of economic entomology to be prepared by the United States entomological commission. *G: D.* (2226)

Bickford, Robert. Honey bee killed by silkweed pollen. (Amer. nat., Jan. 1869, v. 2, p. 665, 4 cm.)

Describes a hive bee [*apis mellifica*] so entangled by the *pollinia* of *asclepias* as to be unable to obtain its food, and hence starved to death. *W: T.* (2227)

Blanc, H. Anatomie et physiologie de l'appareil sexuel male des phalangides. Spermatogénèse, fécondation, hermaphroditisme. (Bull. soc. vaud. sci. nat., Dec. 1880, s. 2, v. 17, no. 84, p. 49-78, pl. 4-6.)

Anatomical results based chiefly on study of *phalangium cornutum, ph. opilio, ph. longipes* and *ph. rotundum.* *G: D.* (2228)

Bobretzky, N. Ueber die Bildung des Blastoderms und der Keimblätter bei den Insecten. (Zeitsch. f. wissensch. Zool., 1878, v. 31, p. 195-215, pl. 14.)

Historical; development of the blastoderm and germinal layer, based upon study of the eggs of *pieris crataegi* and *porthesia chrysorrhea;* summary of processes as follows (p. 207-208):—1st. Before the appearance of the blastoderm an increase takes place in the formed elements in the yolk, which consist of protoplasm with a nucleus and which have the morphological value of true cells.—2nd. A part of such elements gradually comes out of the yolk upon the surface of the egg and there forms the blastoderm, in the formation of which no special blastem layer takes part.—3rd. Another part of the same elements remains in the yolk after the formation of the blastoderm, and later causes the subdivision of the yolk into the so-called yolk-masses or yolk-balls, which are to be considered as true cells.—Comparison with the same processes in the other classes of arthropoda. *G: D.* (2229)

[**Bombyx mori.**] (Journ. applied sci., March 1881, v. 12, p. 43, 23 cm.)

On the weight of cocoons and of eggs, on the number of eggs to a given weight, and on the number of eggs laid by a single moth. *G: D.* (2230)

Bowles, G: J:, *ed.*, *see* CANADIAN ENTOMOLOGIST.

Brandt, Alexander. Uber die Eiröhren der *blatta (periplaneta) orientalis.* (Mém. acad. impér. sci. St. Pétersb., s. 7, v. 21, no. 12.) St. Pétersbourg, 1874. t.-p. cover, t.-p., 30 p., 1 pl., 33×24, t 21×15.3. Pam., 40 kop.

Anatomical; upon the ovaries of *b. orientalis* and the development of the eggs in them. *G: D.* (2231)

Brandt, Eduard [K.]. Ueber die Metamorphosen des Nervensystems der Insekten [Rec., 1451].

Notice. (Monthly journ. sci., Oct. 1879, s. 3, v. 1, p. 703-704.) *G: D.* (2232)

Brandt, Eduard K. Nervnaia sistema os, *vespa.* (Protocoly S.-Peterburgskago obshtshestva estestvoispytateleĭ, tom 7, str. 93.) S.-Peterburg, 1878. 12+3 p., 1 pl., 21×14.5, t 16.5×10.

The development and adult structure of the nervous system of *vespa vulgaris* described and figured. Literature (12 titles). *G: D.* (2233)

Brandt, Eduard K. O nervnoĭ sisteme veerokrylykh, *strepsiptera.* Iz Protokolov Trudov Russkago entomologitsheskago obshtshestva, tom 11, 1878 g. S.-Peterburg, 1878. 8 p., 21×14.5, t 16.5×10.

Anatomy of the nervous system of *strepsiptera:* figures the nervous system of *stylops melittae.* *G: D.* (2234)

Brandt, Eduard K. Ein offener Brief an Herrn Prof. Fr. Leydig. Ueber *evania appendigaster.* St. Petersburg, 1878. 7 p., 21×14.5, t 17×10.

Figures and describes the nervous system of *e. appendigaster.* *G: D.* (2235)

Brandt, Eduard [K.]. Untersuchungen über das Nervensystem der Dipteren [Rec., 1452].

Notice. (Monthly journ. sci., Oct. 1879, s. 3, v. 1, p. 703-704.) *G: D.* (2236)

Brandt, Eduard [K.]. Vergleichend-anatomische Skizze des Nervensystem der Insekten [Rec., 1453].

Notice. (Monthly journ. sci., Oct. 1879, s. 3, v. 1, p. 703-704.) *G: D.* (2237)

Brandt, Eduard [K.]. Vergleichend-anatomische Untersuchungen über das Nervensystem der Hemipteren [Rec., 1454].

Notice. (Monthly journ. sci., Oct. 1879, s. 3, v. 1, p. 703–704.) *G: D.* (2238)

Brandt, Eduard [K.]. Vergleichend-anatomische Untersuchungen über das Nervensystem der Hymenopteren [Rec., 1455].

Notice. (Monthly journ. sci., Oct. 1879, s. 3, v. 1, p. 703–704.) *G: D.* (2239)

Brandt, Eduard [K.]. Vergleichend-anatomische Untersuchungen über das Nervensystem der Käfer, coleoptera [Rec., 1456].

Notice. (Monthly journ. sci., Oct. 1879, s. 3, v. 1, p. 703–704.) *G: D.* (2240)

Brandt, Eduard [K.]. Vergleichend-anatomische Untersuchungen über das Nervensystem der Lepidopteren (Rec., 1457].

Notice. [Monthly journ. sci., Oct. 1879, s. 3, v. 1, p. 703-704.) *G: D.* (2241)

Brandt, Eduard [K.]. Vergleichend-anatomische Untersuchungen über das Nervensystem der Zweiflügler, diptera [Rec., 1458].

Notice. (Monthly journ. sci., Oct. 1879, s. 3, v. 1, p. 703–704.) *G: D.* (2242)

Buchholz. Reinhold. Reisen in Westafrika. . . . Leipzig, F. A. Brockhaus, 1880. . . .

Rev. and extracts entitled "Aus der Insectenwelt Ober-Guinea's." (Das Ausland [Stuttgart], 23 Feb. 1880, p. 147–150, 152 cm.)

Contains, according to *Das Ausland*, much upon the habits of ants and termites, and upon the structure of their nests. *G: D.* (2243)

Bush, *Mrs.* A. E. Ways of *limenitis bredowii.* (Amer. nat., Feb. 1881, v. 15, p. 151.) (Separate [General notes; entomology], from Amer. nat., Feb. 1881, p. 151.)

Brief notes on the habits of this Californian species. *G: D.* (2244)

Butterfly's life (A). ("St. James gazette.") (Springfield [Mass.] d. republican, 9 Oct. 1880, p. 7, col. 1-2, 32 cm.)

Some habits of butterflies. *G: D.* (2245)

Packard, Alpheus Spring, *jr.*, *see* UNITED STATES—*Entomological commission*, Bulletin no. 4. The hessian fly . . . [Rec., 2207].

Riley, C: Valentine, *see* UNITED STATES—*Entomological commission*, Bulletin no. 3. The cotton worm . . . [Rec. 2206].

Schaupp, Frank G: List of the described col. larvae of the U. S. with some remarks on their classification. (Bull. Brooklyn entom. soc., 1879, v. 2, May, p. 1–3; June, p. 13-14; July, p. 21–22; Aug., p. 29–30.)

Introduction, larvae of *cicindelidae, carabidae, dytiscidae, gyrinidae, hydrophilidae, staphylinidae, silphidae* and *scaphidiidae*. *F. G: S.* (2246)

Thomas, Cyrus, *see* UNITED STATES—*Entomological commission*, Bulletin no. 5. The chinch-bug . . . [Rec., 2208].

[**United States.**—*Entomological commission.* Notes about researches on the cotton worm, *aletia*, and on other insects.] (Amer. nat., Aug. 1879, v. 13, p. 535.) *G: D.* (2247)

Vanilla culture. (Journ. applied sci., 1 Sept. 1880, v. 11, p. 129, 22 cm.)

Quotes briefly from Belt's "Naturalist in Nicaragua" [Rec., 72] in regard to insects needed to fertilize the vanilla plant [*vanilla planifolia*]. *G: D.* (2248)

Wailly, Alfred. Silk-producing bombyces. (Journ. soc. arts [Lond.], 1 Aug. 1879, v. 27, p. 813-814, 26 cm.)

Time and duration of copulation of several species of silk-producing *bombycidae;* fertility of their eggs. Extracted from *The entomologist.* *G: D.* (2249)

Waterhouse, C: O. Descriptions of four new species of the genus *inopeplus* (coleoptera, *cucujidae*). (Annals and mag. nat. hist., s. 5, v. 3, p 213.)

Describes *inopeplus aeneomicans* from Jamaica. *R. H.* (2250)

Weale, J. P. Mansel. Observations on the mode in which certain species of *asclepiadeae* are fertilized. (Journ. Linn. soc., Bot., 3 Nov. 1870, v. 13, p. 48-58.)

Enumerates the insects upon which the pollination of several genera depends. *W: T.* (2251)

Wedderburn, D: Carnivorous wasps. (Nature, 26 Feb. 1880, v. 21, p. 417, 6 cm.)

A wasp observed devouring a caterpillar which was alive though considerably mangled. *J. M. W.* (2252)

Westwood, J: Obadiah. [Note on *prosopistoma.*] (Trans. entom. soc. Lond., 1872, Proc., p. 6.)

Lack of perceptible mouth-organs and the structure of the legs characters not in accord with those of *ephemeridae* or *crustacea*. External form resembles *baetisca obesa* Say. *S: H.* (2253)

Westwood, J: Obadiah. Notes on the genus *prosopistoma* of Latreille. (Trans. entom. soc. Lond., 1877, p. 189–194, pl. 4B–5.)

Literature on the subject; non-agreement between Joly's figures and specimens. Direct observation of the transformation necessary to prove the genus one of the *ephemeridae*. Figures *prosopistoma variegatum*, copies figure of *p. punctifrons* from Joly. *S: H.* (2254)

Wetmore, C: A. Propagation of the vine. How to regulate vineyards by the use of seedlings. A treatise illustrating the superiority of constitutionally perfect roots. Also an essay on the physical and moral influence of the vine. 2d ed., with appendix. San Francisco, San Francisco Merchant, 1880. t.-p. cover+t.-p.+[1]+25 p., 23×14.5; 1 pl., 53×71. pm., 25 cts.

Reprinted from the columns of the *San Francisco merchant.* Considers the cultivation of seedling grapes an especially valuable means of preventing the ravages of the phylloxera. *B: P. M.* (2255)

White, C: A. Progress of invertebrate palaeontology in the United States for the year 1879. (Amer. nat., April 1880, v. 14, p. 250–260.)

Alludes (p. 253-254) to S: H. Scudder's papers on fossil insects. *G: D.* (2256)

White, C: A. English sparrows refusing to eat worms. (Amer. nat., Sept. 1880, v. 14, p. 671–672.)

Passer domesticus probably not really an insectivorous bird, as it refuses *lumbricus*, which is favorite food of such birds. *G: D.* (2257)

Whitney, Josiah Dwight. The museum of natural history at Harvard. (Harv. register, Feb. 1880, v. 1, p. 33-34, 56 cm.)

Brief description of the work attempted and that carried out at the Museum of comparative zoology, in Cambridge, Mass. Alludes to Prof. H. A. Hagen's biological collection of insects. *G: D.* (2258)

Worthington, C: Ellis. A list of diurnal lepidoptera inhabiting the state of Illinois. (Can. entom., March 1880, v. 12, p. 46-50.)

Enumerates about 140 species; describes *pamphila ursa* and *p. pottawattomie*, 2 new species. *G: D.* (2259)

ENTOMOLOGICAL ITEMS.

J. M. T. Myers, of Fort Madison, Iowa, offers no. 5123 of Crotch's list in exchange for other beetles.

Prof. C. V. Riley is at work upon an index to the nine volumes of reports made by him from 1869 to 1877, as state entomologist of Missouri.

Prof. C. V. Riley has become the editor of the department of entomology in the *American Naturalist*, the proprietors of that magazine having purchased the subscription list and good will of the "*American Entomologist*."

Under the title of "Bibliotheca Coleopterologica," Mr. F. G. Schaupp is publishing, in the Bulletin of the Brooklyn Entomological Society, lists of the papers on beetles printed in the publications of various scientific societies.

Mr. J. S. Kingsley's Naturalists' Assistant, which Bates, of Salem, will publish early in the fall, will contain quite an extended bibliography in all departments of zoology, special attention being given to American and English authors.

Baron de Chaudoir, of Russia, R. H. McLachlan, of England, and Baron C. R. Osten Sacken, formerly Russian Consul General to this country, have been elected honorary members of the Belgian Entomological Society to fill the vacancies caused by the deaths of Boisduval, Mulsant and Snellen van Vollenhoven. —*Amer. nat.*, April 1881, v. 15, p. 324–325.

According to Dr. Jousset de Bellesme, cocoons do not serve insects as a protection against the cold. The pupa resists congelation by reason of a continuous liberation of heat due to the destruction of the muscular system of the larva, which is much more considerable than that of the mature insect. The large quantity of uric acid discharged at the time of metamorphosis is a proof of the extent of the organic transformations which have taken place.—*Journ. of sci.*, March 1880, p. 214.

SOCIETY MEETINGS.

The regular meetings of the Cambridge Entomological Club will be held at 19 Follen St., at 7.45 p.m., on the days following: —

8 Oct. 1880.
12 Nov. "
10 Dec. "
14 Jan. 1881.
11 Feb. "
11 Mar. 1881.
8 Apr. "
13 May "
10 June "

B: Pickman Mann, *Secretary*.

The regular meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following:—

27 Oct. 1880.
24 Nov. "
22 Dec. "
26 Jan. 81.
23 Feb. 1881.
23 Mar. "
27 Apr. "
25 May "

B: Pickman Mann, *Secretary*.

The regular meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following: —

8 Oct., 1880.
12 Nov. "
10 Dec. "
14 Jan. 1881.
11 Feb. "
11 Mar. 1881.
8 Apr. "
13 May "
10 June "

James H. Ridings, *Recorder*.

The semi-annual meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following: —

13 Dec. 1880.
13 June 1881.

James H. Ridings, *Rec. Sec'y*.

The regular monthly meetings of the Montreal Branch of the Entomological Society of Ontario will be held at Montreal, Que., Canada, on the days following: —

7 Sept. 1880.
5 Oct. "
2 Nov. "
7 Dec. "
4 Jan. 1881.
1 Feb. "
1 Mar. "
5 Apr. "

G: H. Bowles, *Secretary*.

PRIZE ESSAYS.

Due 15 Oct. 1882.— Life-histories of *Sclerostoma syngamus* and of *Strongilus pergracilis*. See Psyche, v. 3, p. 59.

ADVERTISEMENTS should reach the editors by the 10th of the month preceding the one in which they are to appear.

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VI. Jahrg. 1880.

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No. 1. The Entomological Writings of John L. LeConte. Compiled by Samuel Henshaw. Edited by George Dimmock. Nov. 1878. 11 p. t 19 × 12.5. Price, 30 cents; on 5 × 12.5 title-slips, $1.25.

No. 2. The Entomological Writings of George H. Horn. Compiled by Samuel Henshaw. Edited by George Dimmock. Jan. 1879. 6 p. t 19 × 12.5. Price, 20 cents; on 5 × 12.5 title-slips, 50 cents.

No. 3. The Writings of Samuel Hubbard Scudder. Compiled and edited by George Dimmock. Aug. 1879. 28 p. t 19 × 12.5. Price 50 cents.

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Department of Agriculture,
Washington, D. C.

No. 83 was issued 25 July 1881.

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ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

[Established in 1874.]

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Vol. 3. No. 85.

MAY 1881.

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CAMBRIDGE, MASS., U. S. A.: PUBLISHED BY GEORGE DIMMOCK.

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[Entered as second class mail matter.]

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SOME PSOCINA OF THE UNITED STATES.

BY HERMANN AUGUST HAGEN, CAMBRIDGE, MASS.

(Continued from p. 196.)

Genus Elipsocus.

The genus *Elipsocus* is a very natural one. Mr. Kolbe has separated *E. unipunctatus* from the rest as belonging to a different genus *Mesopsocus* Kolbe. This species, it is true, has a peculiar facies, nevertheless the differences do not appear to justify a generic separation, the more as a new species *E. laticeps* Kolbe is perhaps only a variety of *E. unipunctatus*. Both have no hairs on the veins of the wings, which is an exception in *Elipsocus*. The differences quoted by Kolbe for *Mesopsocus* consist chiefly in the venation, and represent differences found as variations in the same species. Among thirty European specimens now before me, twenty have the venation of *Mesopsocus* (*alarum anticarum ramus venae medianae interior ramusque venae submedianae exterior venula transversali conjuncti*, Kolbe); the other ten specimens have both rami united in a point (without the *venula transversalis*); one of them has the rami confluent, as figured by Spangberg, and described as a character of *E. laticeps* by Kolbe. The other differences of the venation quoted by Kolbe are even less important, and occur likewise in *E. unipunctatus*. I may state that my specimens are from Sweden, Eastern Prussia, Saxony, Posen, Hamburg, and Elberfeld, and that the before mentioned varieties were found together with the normal form.

The claws of the legs of *E. unipunctatus* have a tooth below, before the point, only visible with the compound microscope. The claws are 0.05 mm. long, the tooth 0.003 mm. The basal third of the claw is enlarged below, forming a prominent edge. I remark that the nearly related genus *Caecilius*, except *Pterodela*, has no tooth on the claws in living and fossil species, and is, as far as my observation goes, the only one with toothless claws. The genital appendages of the male of *E. unipunctatus* are covered by a large spoon-shaped valve, which is bluntly pointed above; the appendages black, somewhat incurved, narrow, truncated on tip; the external border truncated in the middle, therefore not reaching the tip. The penis appears to be long and stiletto-shaped.

In the Synopsis of the Neuroptera of North America, p. 9, at no: 3, *Psocus signatus*, I have stated my doubts concerning the distinctness of this species from *Ps. immunis* Steph. (= *unipunctatus*). There are before me five specimens from Massachusetts and New York, which, after a very detailed examination, I am unable to separate from the European species. The slight differences of the venation, spoken of before, occur also among the North American specimens. The identity of the species is made more sure by the fact that short-winged specimens are found in Europe and in North America, and that till now *E. unipunctatus* is the only species of which short-winged specimens are known. I possess three specimens from Eastern Prussia, found together with the long-winged specimens, and two from New York, which I received together with the types of *Ps. signatus.*

Mr. Kolbe is inclined to doubt the existence of short-winged specimens (Monogr. deutsch. Psociden, p. 95), and therefore I may give here some more detailed information. The specimens agree exactly with the figure given by Westwood, Introd., v. 2, f. 59, no: 13, 14, 15. The only difference is the absence of ocelli according to Westwood's statement, but I think that probably he used a lens of low power. The ocelli are easily seen with the compound microscope; they do not stand upon a circular elevation as in the long-winged specimens, but upon the flat surface of the head. The cornea is very little convex, but sharply defined around its border, and shining; the anterior ocellus is smaller, and in one specimen the cornea is like a dull membrane. In another specimen this ocellus is deepened, but a small shining cornea is visible in the hole. The diameter of the two posterior ocelli is 0.04 mm.; the anterior is smaller. I saw Westwood's type years ago, but did not examine the ocelli, which are very easily overlooked without the use of a compound microscope.

The rudiments of the wings are small ovoid scales, attached to the external margin of the mesothorax and to the metathorax with a very short stem, and not with a broad base as commonly in the nympha state. The scales lie close to the thorax and are scarcely longer than the segment to which they belong; they are opaque, chitinous, only the apical half thinner and somewhat transparent, yellow as the main color of the body of the insect, without veins, but with a darker middle stripe; the border around the scale somewhat thicker.

The head of the short-winged specimens and the large eyes are similar to those of the normal form, excepting the want of the circular elevation bearing the ocelli. The antennae hairy but thinner. Size, body and legs as in the normal form. The genitals are not to be observed surely in the dry specimens, but seem to be similar to those of the normal form. One is surely, three are probably male; one seems to be a female, and the eyes are more separated. I think the appearance of such specimens is by no means exceptional, as similar short-winged imagos are known to exist among the *termitina* and *perlina.* They are imagos with rudimentary wings.

I remark that I had accepted for the species the name *E. aphidiodes* Schrank, because it is doubtless sure, though Mueller's name *E. unipunctatus*, the identification of which was first pointed out by myself, is only probably sure.

Psocus venosus Burm.

The species is found everywhere from Canada down to the Gulf of Mexico and occurs also in Cuba. I do not know whether it is found west of the Rocky Mountains or not. It appears to live gregariously, sometimes in large numbers, on apple trees, in all different stages. As it is here the largest species, I have tried to study it carefully, and give here a short notice of some entirely new characters, which may be observed partly in other species.

The wings of *Psocus* have mostly been treated of in a rather summary manner. The venation is considered in a different way by different writers, but a satisfactory study of the species not belonging to the European fauna has thus far been wanting, and such a study will probably lead to better knowledge. I use here, for convenience, the nomenclature adopted by Mr. Kolbe in his new monograph, reserving until a future time and as the result of farther advanced study, the introduction of some changes. I would here draw attention to a few characters, which I find nowhere mentioned.

1. At the extreme base of fore and hind wing of *Psocus venosus* (and several related species), just below the the subcosta, there is a darker, more chitinous place, bordered below by the median vein and ending in front about where the submedian begins. Examined with a rather strong lens, this place (0.2 mm. long) has the appearance of a sieve with numerous round holes of 0.003 mm. diameter, arranged in a series of longitudinal lines, not strictly keeping in the lines. In changing the focus, every hole is found to have a small sensitive bristle in the centre. The whole arrangement is similar to that on the base of the wings of diptera or on the antennae of insects, described long ago, and presumed to represent the sense of hearing. I have hitherto been unable to prove the presence of nerves and ganglia in this place, but such will be found without doubt. In full grown nymphae I was able to see the same arrangement, but in a less definite shape. The small holes have not such sharp borders in the nymphae as in the imagos, and the middle elevation seems to be larger than in the imago.

2. The wings of full-grown nymphae, while still contained in the wing case, show nearly the whole venation indicated by paler lines, representing the veins, which are blood vessels. Around the margin of the whole forewing runs a broad sinus (0.016–0.023 mm.), with which the other veins are connected. The whole wing is dull, not hyaline, pale grayish, densely filled with cells. The tracheae are very small (0.0017 mm. diameter against 0.005 in the imago), often only indicated, and the spiral thread not visible or replaced by transverse nuclei. In an earlier stage there is found as the first indication of a trachea, one series of cells arranged in a band. The trachea forming the analis of Kolbe is always broader (0.0025 mm. diameter, against 0.03+ in the imago). The analis belongs to the underside of the wing and is, as far as I know, the only one not accompanied by a blood vessel, and formed only by a trachea for purposes later to be spoken of. The hind border of the wing case has two series of long bristles (0.104 mm. long).

Specimens just after transformation show the wings hyaline but somewhat milky. The larger veins and the pterostigma are filled with a large number of blood-cells. The two membranes of the wings, even in the imago state, are less firmly glued together than in other insects, and easily separated if the wing is touched roughly or glued with one side on paper or glass. The membranes of the hind wings are still less firmly connected than those of the forewings. In going through a moderately large collection of *Psocus*, specimens will be found showing a separation of the two membranes at least in some parts. The same is often to be seen in fossil species included in amber or in copal.

All veins show numerous short appressed hairs, the longest on the marginal vein around the wing (0.009 mm. long). The only vein without any clothing of hairs is the analis. The whole membrane of the wing is beset more or less densely with similar but much smaller hairs (the longest 0.003 mm.).

It is a fact new to me that the whole venation, with the exception of the subcostalis and analis, consists of a double net, not only of veins, as I have proved long ago, but also of tracheae, one net belonging to the upper membrane, the other to the lower one. Both are exactly alike and cannot be seen when the two membranes are firmly glued together. When separated, which occurs more easily in the hind wings, both nets are clearly visible, and each trachea of the upper membrane joins the corresponding one of the lower membrane in a loop at the margin. I have to remark that the tracheae seem only in juxtaposition to the blood veins, at least I have established this undoubtedly in the case of the mediana. A more detailed study of the origin of the veins will probably give a more certain basis of facts for identifying the value of the veins, and for contributing to a better founded nomenclature. For instance, the ramus medianae interior in the hind wings is united with the ramus submedianae exterior at the base of the wing, and both can only be considered to be the two branches of the same vein. In the forewing the ramus medianae interior is a branch of the mediana and the ramus submedianae exterior a branch of the submediana. The mediana originates from the anterior basal wing-callus, the submediana from the posterior wing-callus; nevertheless both veins are connected by a tracheal loop at the extreme basis of the wings. I have purposely given this in such detail, because the whole disagreement about the nomenclature of the veins between McLachlan and Kolbe consists in this point. But I have not yet finished my studies to a point satisfactory to myself, so as to emit a positive opinion about those veins.

The somewhat loose connection of the two membranes of the wings, and the fact that the tracheae are double and constitute, for a very large part, the venation, easily explains the very frequent variations and warns us to use such differences only or chiefly for generic separation. (*To be continued.*)

PSYCHE.

CAMBRIDGE, MASS., MAY 1881.

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PROCEEDINGS OF SOCIETIES.

52ND MEETING OF GERMAN NATURALISTS AND PHYSICIANS IN BADEN-BADEN.

WE find in the *Entomologische Nachrichten* for 1 April 1880, Jahrg. 6, p. 65-79, a notice of the meeting entitled above, by M. von Hopffgarten, of Mülverstedt. The Entomological section of this meeting, now four years old, is declared to be the centre of German entomological life. After some irrelevant matter, and a list of the eighteen persons present, a list is given of the communications presented. Dr. von Heyden, of Frankfort, mentioned that Tournier had found a species of *Laccobius*, which he named *thermarius*, in a hot spring, of temperature 47½-49° C., in Baden, Switzerland. Mr. Köppen, of St. Petersburg, called attention to a bibliography of the zoology of Russia which he had published in German. Baron von Osten-Sacken, now of Heidelberg, spoke of "Certain remarkable cases of the geographical distribution of *tipulidae*," an abstract of which communication is given as follows: —

Five species of the genus *Ptychopterina* are known; one is found in the Atlantic states of North America, one in California, one in Chili, one in New Zealand and one in amber. The genus *Elephantomyia* is found in the Atlantic states of North America, in California, and in amber. The genus *Prochobola* is known from northern and middle Europe, North America, New Zealand, Van Dieman's Land and South Australia. Several species of the group *anisomerina* with enormously long antennae in the males occur in the Atlantic states of North America and similar species are still found in amber. The rather frequent contact of the [eastern] North American fauna with that of the amber, on the one hand, and that of California, Chili and Australia, on the other hand, is especially worthy of note, as is also the circumstance that in certain genera of diptera sporadic occurrence is more frequent than it is in the other orders of insects. Considerable discussion followed this communication, involving the question of the geographical distribution of cave-insects.

Several ingenious pieces of collecting apparatus were exhibited, and methods of capture were discussed. Five sessions were held.

Baron von Osten-Sacken proposed that a loan-library should be formed, for the benefit of entomologists, from which any one might obtain books without fee. He offered, in case such a library were established, to present to it about 300 works treating of diptera, mostly separates. Dr. Noll, of Frankfort, said that such a library, containing works on malacozoology, had already been established at Frankfort-on-Main, and that it would be a good plan to choose that city for the *locale* of this new library. This, together with other propositions that were brought forward at the final session, was referred to the meeting to be held in 1880.

A notice is given further of collections examined and excursions made, and the author concludes with an expression of exultation that the entomologists felt strong enough to resist the attempt of the zoologists to swallow their section.

It was determined to hold the next meeting 18-24 Sept. 1880, in Danzig. *B: P. M.*

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [ ], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

Corrections of errors and notices of omissions are solicited.

Agricultural department's view of the army worm (The). (Springfield [Mass.] d. republican, 16 June 1880, p. 4, col. 5, 15 cm.)

Notes, on authority of J: H: Comstock, in regard to *leucania unipuncta* and modes of destroying it. *G: D.* (2260)

B., R. T. Singulière nourriture d'un névroptère. (Feuille des jeunes naturalistes, 1 Nov. 1880, an. 11, p. 14.)

Discovers *panorpa communis* eating portions of fishes which had been placed on a sunny bank. *G: D.* (2261)

Biggest of spiders (The). (Springfield [Mass.] d. republican, 21 June 1880, p. 2, col. 6, 6 cm.)

Extract from paper by Frank Buckland in *Land and water.* *G: D.* (2262)

Bugnion, Édouard. Métamorphoses du *meigenia bisignata*, mouche parasite de la tribu des tachinaires. (Bull. soc. vaud. sci. nat., Dec. 1880, s. 2, v. 17, no. 84, p. 17-31, pl. 1-2.)

Description and figures of the larva and pupa, and figure of imago, of *m. bisignata*, whose larva is parasitic in larvae of the chrysomelids *lina tremulae*, *paropsis sexpunctata* and *agelastica alni*, in larvae of the tenthredinid *athalia spinarum*, and in larvae of the geometrid *gymnancyla canella.* Comparisons of larva of *m. bisignata* with larvae of *tachina villica* and of *m. bombivora*, with general remarks and citations upon other tachinid larvae. Quotes from Osten Sacken in regard to tachinid larvae and their hosts. Notes on larvae of *phora* found parasitic on larvae of *lina tremulae.* *G: D.* (2263)

Carpenter, W: L. List of species of butterflies received from Fort Niobrara, Nebraska. (Can. entom., Dec. 1880, v. 12, p. 252.)

Enumerates 26 species. *G: D.* (2264)

Camerano, Lorenzo. Descrizione di alcuni insetti monstruosi delle raccolte entomologiche del R. museo zoologico di Torino. Torino, Laboratorio del Regio museo zoologico di Torino, 1878. t.–p. cover, 9 p., 23×16, t 15×9; fig. 1–7.

Separate from the *Atti della reale accademia delle scienze di Torino*, v. 14. Deformities of 7 species of coleoptera, 1 each of hymenoptera, orthoptera, hemiptera and lepidoptera. *G: D.* (2265)

Camerano, Lorenzo. Di alcune variazioni avvenute nella fauna entomologica del contorno di Torino. Nota. Studio fatto nel Laboratorio del R. museo zoologico di Torino. Torino, 1878. t.–p. cover, 6 p., 23×16, t 16×9.5.

Separate from the *Annali della reale accademia d'agricoltura di Torino*, v. 21. Discusses the changes in the entomological fauna of the neighborhood of Turin, Italy, and their causes. *G: D.* (2266)

Camerano, Lorenzo. Polimorfismo nella femmina dell' *hydrophilus piceus* Linn. Torino, 1877. t.–p. cover, 11 p., 1 pl., 23×16, t 15×9.

Separate from the *Atti della reale accademia delle scienze di Torino*, v. 12. Figures and describes 3 forms of females of *h. piceus.* *G: D.* (2267)

Chambers, T. Wasps as marriage priests to plants. (Amer. nat., Apr. 1867, v. 1, p. 105–107, 1 fig.)

Describes and figures the tarsus of one of the *larridae* laden with the pollen-masses of an *asclepias*, and calls attention to the figures of Savigny and Westwood showing pollinia of this genus attached to the palpi of the same family. The communication is accompanied by notes by Horace Mann and the editor of the Naturalist. *W: T.* (2268)

Chambers, Vactor Tousey. On the early stages of *gracilaria stigmatella*, Fabr. (Can. entom., Feb. 1881, v. 13, p. 25-28.)

Notes on the life-history of *g. stigmatella*, of *g. syringella* and of other *tineidae.* *G: D.* (2269)

Change in the nervous system of beetles during metamorphosis. (Amer. nat., Jan. 1881, v. 15, p. 58-59.)

Brief rev. and abstract of H. Michels' "Beschreibung des Nervensystems von *oryctes nasicornis*" . . . [Rec., 1979.] *G: D.* (2270)

Claypole, E: W. Notes on *lytta*, blister-beetles. (Can. entom., Dec. 1880, v. 12, p. 245-246.)

Notes on habits of *l. atrata*, *l. cinerea*, *l. marginata*, and *l. vittata.* *G: D.* (2271)

Comstock, J: H: Notes on *coccidae*. (Can. entom., Jan. 1881, v. 13, p. 8–9.)

Describes a new species, *aspidiotus citri*, from the orange [*citrus*] in California, probably an introduced species from Australia. *G: D.* (2272)

Conner, Browni. San Francisco gossip. (Springfield [Mass.] d. republican, 29 Sept. 1880, . . . 84 cm.)

Notes [5 cm.] on silk-raising in California. *G: D.* (2273)

Cook, Albert J: The relation of apiculture to science. (Amer. nat., March 1881, v. 15, p. 195-203.)

Chiefly biological notes on *apis mellifica.* A paper read before the Entomological subsection of the American association for the advancement of science, at its Boston meeting (1880). *G: D.* (2274)

Coquillett, Daniel W: On the early stages of *plusia precationis,* Guenee. (Can. entom., Feb. 1881, v. 13, p. 21-23.)

Describes egg, larva and pupa; notes on habits of imago. *G: D.* (2275)

Cotton crop (The). (Springfield [Mass.] d. republican, 16 Oct. 1880, p. 4, col. 6, 10 cm.)

Notes on losses from caterpillars. *G: D.* (2276)

Crickets as pets. ("Indianapolis [Ind.] journal.") (Springfield [Mass.] d. republican, 8 Jan. 1880, p. 3, col. 1, 31 cm.)

Notes on habits of crickets confined as pets. *G: D.* (2277)

Croneberg, A. Ueber den Bau der Hydrachniden. (Zool. Anzeiger, 2 Dec. 1878, jahrg. 1, p. 316-319.)

Abstract, by E: Burgess. (Psyche, March 1880, v. 3, p. 29-30.)

Internal anatomy of *hydrachnidae.* *G: D.* (2278)

Darwin, Francis. Alpine flowers. (Nature, 10 Feb. 1881, v. 23, p. 333-335.)

Review of H. Müller's "Alpenblumen" . . . [Rec., 2175]. *W: T.* (2279)

Darwin, Francis. Bees visiting flowers. (Nature, 8 Jan. 1874, v. 9, p. 189-190, 46 cm.)

States that flowers of *lathyrus sylvestris* growing in quantity are perforated by humble-bees [*bombus*] for their nectar. Shows how bees obtain nectar from the flowers of *phaseolus multiflorus.* *W: T.* (2280)

Detection of glucose and cane syrup in honey. (New remedies, Feb. 1881, v. 10, p. 54. 6 cm.)

From *The druggist;* originally from a paper by Planta-Reichman. *G: D.* (2281)

Dodge, G: M. On a variety of *catocala nebraskae,* Dodge. (Can. entom., Feb. 1881, v. 13, p. 40.)

Describes *c. nebraskae* var. *somnus.* *G: D.* (2282)

Dogiel, Johannes. Anatomie und Physiologie des Herzens der Larve von *corethra plumicornis.* (Mém. acad. impér. sci. St. Pétersb., 1877, s. 7, v. 24, no. 10.) St. Pétersburg, 1877. t.-p. cover, t.-p., 37 p., 33×25, t 21×15.2; 2 pl.

Anatomy of the heart of *c. plumicornis;* its valves, muscles and nerve-cells; the aorta; physiological experiments on the rapidity of pulsation under the influence of different temperatures, of electricity, and of 22 different poisonous chemicals. *G: D.* (2283)

Donckier de Donceel, Henri, *see* BRONGNIART, C: *and* Max CORNU, Epidémie causée sur des diptères . . . [Rec., 2087].

[**Doryphora decemlineata.**] (Springfield [Mass.] d. republican, 5 Aug. 1880, col. 3, p. 8, 4 cm.)

A Maryland farmer experiments on the coloring matter from *d. decemlineata.* *G: D.* (2284)

[**Doryphora decemlineata.**] (Springfield [Mass.] d. republican, 1880: 3 Jan., p. 7, col. 1, 2 cm.; 29 May, p. 6, col. 4, 1 cm.; 18 June, p. 6, col. 6, 1 cm.; 3 July, p. 6, col. 1, 2 cm.; 1 Oct., p. 5, col. 6, 1 cm.)

Different items on *d. decemlineata* in New England and New Brunswick. *G: D.* (2285)

Doryphora en Belgique! (La). Liége, 1877. t.-p. cover, 31 p., 18×12, t 11×7.8.

Humorous account of the means taken to suppress *doryphora decemlineata* upon its first appearance in Belgium. *G: D.* (2286)

Drive away roaches (To). (New remedies, Feb. 1881, v. 10, p. 63, 7 cm.)

Recommends various modes of destroying *blatta.* *G: D.* (2287)

Dufort, Aimé. Un lépidoptère à trompe perforante, ravageur des oranges en Australie. (Bull. soc. d'acclimatation, July 1876.)

Separate, Paris, 1876. t.-p. cover, 9 p., 24×15, t 17×9.5.

Description and figure of *ophideres fullonica,* and of its proboscis with which it pierces the rind of oranges. *G: D.* (2288)

Dury, C: Note on *chrysomela juncta, ch. 10-lineata* and *caryoborus arthriticus.* (Can. entom., Jan. 1881, v. 13, p. 20.)

Chrysomela juncta with *ch. decemlineata* in Ohio; the two species taken pairing with each other; difference of the larvae of the two species; how to prepare specimens and retain their color. *Caryoborus arthriticus* from seeds of the Sabal-palmetto in Florida. *G: D.* (2289)

Edwards, W: H: Capture of a bi-formed *lycaena.* (Can. entom., Aug. 1880, v. 12, p. 160.)

Notes a male *l. neglecta* one side of which had the coloration of the female. *G: D.* (2290)

Edwards, W: H: Concerning *chrysophanus nais*, Edw. (Can. entom., Jan. 1881, v. 13, p. 17–18.)

Systematic position discussed; quotes a part of a letter from A. G. Butler, who regards the species as belonging to *apodemia*, of the *erycinidae*. *G: D.* (2291)

Edwards, W: H: Description of a new species of *limenitis*. (Can. entom., Dec. 1880, v. 12, p. 246–251, fig. 24.)

Crit. rev., by H. Strecker, entitled "On a lately described species of *limenitis*." (Can. entom., Feb. 1881, v. 13, p. 29–30.)

Description of larva, chrysalis and imago of *l. eros*, new species, from Fla. Larva feeds on *salix*. *G: D.* (2292)

Edwards, W: H: Description of a new species of *pamphila* from Florida. (Can. entom., Nov. 1880, v. 12, p. 224–225.)

Describes *p. byssus*, new species. *G: D.* (2293)

Edwards, W: H: Description of the preparatory stages of *euptoieta claudia*, Cramer. (Can. entom., Nov. 1880, v. 12, p. 231–235.)

Description of egg, larva, and pupa of *e. claudia*. Larvae feed on species of *passiflora*, *viola*, and *sedum*. *G: D.* (2294)

Erler, ——. Die Ueberwinterung der Biene. (Deutsch. Bienenfreund, 1881, jahrg. 17: 1 Jan., p. 4–8; 15 Jan., p. 18–23.)

Conditions necessary to observe for the preservation of bees, in a healthy state, through the winter. *G: D.* (2295)

Farrer, T. H. Fertilization of papilionaceous flowers. (Nature, 2 July 1874, v. 10, p. 169–170, 60 cm.)

Shows how bees fertilize the flowers of species of *coronilla* while gathering nectar secreted on the outside of the calyx. *W: T.* (2296)

Farrer, T. H. On the fertilization of a few common papilionaceous flowers. (Nature, 1872, v. 6: 10 Oct., p. 478–480; 17 Oct., p. 498–501.)

Describes the structure of the flowers, and the actions of insects when visiting them. *W: T.* (2297)

Fatal discipline. (Springfield [Mass.] d. republican, 2 March 1881, p. 5, col. 3, 6 cm.)

Death of a lieutenant of the U. S. A., caused by a spider going into his ear, while on parade at West Point, N. Y. *G: D.* (2298)

Feil, Joseph. Native *pyrethrum*. (New remedies, April 1881, v. 10, p. 116, 9 cm.)

Mostly a quotation from Bull. no. 3 of the U. S. entom. comm. [Rec., 2206], on raising *p. cinerariaefolium*, for insect powder, in California. *G: D.* (2299)

Flights of "flies." (Amer. nat., Nov. 1880, v. 14, p. 805.)

Clouds of flies on the Hudson river, near Newburg, N. Y., and in Nova Scotia. *G: D.* (2300)

French, G: Hazen. Notes on *catocala* hunting. (Can. entom., Nov. 1880, v. 12, p. 241–242.)

Record of captures at Carbondale, Ill. *G: D.* (2301)

French still looking toward American vines (The). ("Pacific rural press.") (Amer. nat., April 1881, v. 15, p. 322.)

Authorisation of the introduction of American vines [*vitis*] into the department of the Gironde, France. Items about *phylloxera*. *G: D.* (2302)

Goodell, Lafayette Washington. On a new species of *packardia*. (Can. entom., Feb. 1881, v. 13, p. 30–31.)

Describes *p. nigripunctata*, reared from a larva found upon oak [*quercus*] in Amherst, Mass. *G: D.* (2303)

Goodell, Lafayette Washington. On the early stages of four geometrid moths. (Can. entom., Nov. 1880, v. 12, p. 235–236.)

Notes on larvae of *ochyria designata*, *eucrostis chloroleucaria*, *eutrapela transversata* and *acidalia enucleata*. *G: D.* (2304)

Good words for the skunk. ("Cincinnati commercial.") (Springfield [Mass.] d. republican, 14 June 1880, p. 7, col. 1–2, 15 cm.)

The skunk [*mephitis mephitica*] should be allowed to live, on account of its eating insects; it eats *doryphora decemlineata* and larvae of *lachnosterna*. *G: D.* (2305)

Grote, A: Radcliffe. [*Hadena confederata.*] (Can. entom., Dec. 1880, v. 12, p. 264.)

This species is found in N. Y., Tex., La., Mass., and Fla. *G: D.* (2306)

Grote, A: Radcliffe. New species of N. Am. moths. (Can. entom., Oct. 1880, v. 12, p. 213–220.)

Describes 15 new species of *lepidoptera heterocera*, from the United States. *G: D.* (2307)

Grote, A: Radcliffe. North American moths. (Can. entom., 1880, v. 12: Nov., p. 242–244; Dec., p. 254–258; 1881, v. 13: Jan., p. 14–17; Feb., p. 33–35.)

Describes 22 new species; lists of species of *oncocnemis*, *homohadena*, and *tarache*, with locality of capture of each species and other notes. *G: D.* (2308)

Grote, A: Radcliffe. On the synonymy of North American *noctuidae*. (Can. entom., Sept. 1880, v. 12, p. 184–188.)

Gives the synonymy of 27 species described by H. K. Morrison. *G: D.* (2309)

[**Lubbock**, J:] The communicative ant. (N. Y. d. tribune, 26 Dec. 1880, p. 9, col. 1, 24 cm.)

Extract from a paper by *Sir* J. Lubbock. A species of *atta*, having found a fly, communicates with other ants in the nest and they go out together to secure the fly. *G: D.* (2310)

ENTOMOLOGICAL ITEMS.

Miss Eleanor A. Ormerod has a manual of economic entomology in the press.

The Boston Transcript for 9 April 1881 contains an article by Dr. H. A. Hagen, entitled, "Lawsuits against grubs and grasshoppers."

A late number of Siebold and Kölliker's Zeitschrift contains an important paper on the dimorphism of oak gall-flies (*cynipidae*), by Dr. H. Adler.

Mr. F. P. Pascoe read a paper on the structure of *Peripatus novae-zealandiae* at the meeting of the Entomological Society of London, 2 Feb. 1881.

It is now considered as beyond doubt that *Phylloxera vastatrix* exists in Australia; and Victoria, New South Wales and South Australia are to contribute about $100,000 towards the expense of exterminating it.

Mr. A. Ernst has found *Peripatus edwardsii* quite abundant at Caràcas and in a recent numero of *Nature* (v. 23, p. 446–448) gives a short account of its habits and structure and of the development of claws, of foot-jaws and of sexual organs.

A farmer in South Devon, England, having living specimens of the Colorado potato beetle (*Doryphora decemlineata*) in his possession and refusing to give them up to the authorities, was fined £5. The case attracted the attention of the House of Commons.

The Belgian Entomological Society recently celebrated its twenty-fifth anniversary. Baron de Selys-Longchamps, the first President, to whom the society owes so much of its success, was unanimously elected Honorary President.—*Amer. nat.*, March 1881, v. 15, p. 562.

Mr. W. W. Hill, of Albany, N. Y., offers specimens of lepidoptera, well spread and in fine condition, from his list of over 500 species of North American and 300 species of European and other duplicates, in exchange for perfect spread examples not in his collection. Lists exchanged.

SOCIETY MEETINGS.

The regular Meetings of the Cambridge Entomological Club will be held at 19 Follen St., at 7.45 p.m., on the days following:—

8 Oct. 1880.
12 Nov. "
10 Dec. "
26 Jan. 1881.
11 Feb. "
11 Mar. 1881.
8 Apr. "
13 May "
10 June "

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following: —

27 Oct. 1880.
24 Nov. "
22 Dec. "
26 Jan. 1881.
23 Feb. 1881.
23 Mar. "
27 Apr. "
25 May "

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following:—

8 Oct. 1880.
12 Nov. "
10 Dec. "
14 Jan. 1881.
11 Feb. "
11 Mar. 1881.
8 Apr. "
13 May "
10 June "

James H. Ridings, *Recorder.*

The semi-annual meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following:—

13 Dec. 1880.
13 June 1881.

James H. Ridings, *Rec. Sec'y.*

The regular monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following:—

6 Sept. 1881.
4 Oct. "
1 Nov. "
6 Dec. "
3 Jan. 1882.
7 Feb. "
7 Mar. "
4 Apr. "

G: H. Bowles, *Secretary.*

PRIZE ESSAYS.

Due 15 Oct. 1882.—Life-histories of *Sclerostoma syngamus* and of *Strongilus pergracilis.* See Psyche, v. 3, p. 59.

ADVERTISEMENTS should reach the editors by the 10th of the month preceding the one in which they are to appear.

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Department of Agriculture,
Washington, D. C.

No. 84 was issued 18 Aug. 1881.

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ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

[Established in 1874.]

EDITED BY

George Dimmock, *Cambridge, Mass.;* B: Pickman Mann, *Cambridge, Mass.;*
Albert J: Cook, *Lansing, Mich.;* Clifford Chase Eaton, *Cambridge,*
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Vol. 3. No. 86.

June 1881.

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Cambridge, Mass., U. S. A.: Published by George Dimmock.

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PSYCHE.

SOME PSOCINA OF THE UNITED STATES.

BY HERMANN AUGUST HAGEN, CAMBRIDGE, MASS.

(*Concluded from p. 210.*)

3. *Pterostigma-hook.* This curious feature has until now been entirely overlooked. It is mostly " the small black or dark spot at the basis of the pterostigma" mentioned in the description of the species. Apparently low magnifying powers have always been used in the study of *Psocus*. The subcosta of the fore wings always goes to the mediana, except in *Amphientomum* and related genera, *Perientomum*, *Syllisis*, *Calopsocus* and other exotic forms, where the subcosta joins the costa. Sometimes the subcosta ends abruptly, without joining one of the two adjacent veins. Whether this vein is analogous to the subcosta, as McLachlan contends, or whether it is only a branch of the subcosta similar to that in *Calotermes* and other insects, is still a point of dispute. I never saw it accompanied by a trachea, nor, as far as my observation goes, have I seen a trachea accompanying the costa from the base of the wing to the pterostigma.

The mediana is accompanied by a very strong trachea from the base to the pterostigma. This trachea is not contained in the vein, but runs very near it, below, sometimes indeed separated from it a little, so that two veins seem to be present here. At the beginning of the pterostigma the trachea has a spindle-shaped, more or less long dilatation, a tracheal bladder, with visible but more separated spiral threads. This dilatation lies below a small sac or better a hernia of the mediana, before it enters the large sac or blood sinus represented by the pterostigma. This hernia is not developed in the wing of the nympha, but just after transformation it is found, as well as the pterostigma, crowded with blood cells. The hernia is found, sometimes very visible, in most of the genera, except in a few aberrant groups such as *Amphientomum* and its relations, *Empheria* and perhaps others. There the spindle-shaped tracheal bladder is present, but simply follows the end of the mediana to the costa. Where the hernia is present, it lies on the under side of the wing, where the mediana enters the costa, and forms together with it the pterostigma. Probably the stronger current in the costa somewhat opposing the current of the mediana is the reason of the formation of the hernia, to overcome the pressure of the current in the mediana. As everywhere in insects where strong currents occur, accompanied by strong tracheae, we find here the tendency to a more prominent chitinization. Therefore the hernia shows very different forms, a ball, a circular or bottle-shaped inflation or a more or less chitinous and dark-colored often sharp hook, as in *Caecilius*, *Peripsocus* and others. In *Psocus* (proper) it has mostly the shape of a fleshy cone. An interesting feature of this arrangement is that the trachea seems in *Psocus* (proper) to enter the pterostigma-sac after the spindle-shaped bladder. We find sometimes that the end of the trachea does not follow strictly the lower and the external margin of the pterostigma, and such occurrences are marked in the description, the "pterostigma somewhat exceeds the vein below and externally," whereas it exceeds not the vein but only the trachea.

4. *The lock of the fore-wings.*

It is well known that lepidoptera, hymenoptera, orthoptera, and *phryganina* possess an arrangement on the hind margin of the fore wings to clasp the front margin of the hind wings during flight. Thus both wings work exactly together as if there was only one wing on each side. This arrangement — which I call the lock — is of very different shape and form, and is nowhere mentioned as existing in the family of *psocina*. As far as my observations go, it is to be found in every four-winged genus, just where the anal vein is united to the hind margin. Descriptions of the species remark frequently a dark or black spot in this place, which spot covers the lock. The parts are here, as they are in the pterostigma-hook, more strongly chitinous, and as everywhere, in consequence of stronger action impending upon those parts, darker colored. The anal vein is an exception, compared with other veins, because it is not accompanied by any blood vessel; at least I have not been able to discover one even in the newly transformed imago. Furthermore the anal vein has always an aspect different from all others; it looks clear and as if something present on the other veins was wanting here. But there is another remarkable difference. As said before, all the other veins form a double net of tracheae, one belonging to the upper membrane of the wing, the other to the under membrane; both exactly covering one another, and their veins forming a loop at the hind border of the wing. Now the anal vein belongs strictly to the under side of the wing, and, as it seems, only the branch belonging to the under membrane is developed, and this is provided with a spiral thread much stronger than in the other veins and passing on each side considerably beyond the trachea, which has therefore more or less dentated margins. The anal vein of the upper membrane can not be entirely wanting, and I was able to observe that it forms a very small, perfectly hyaline vessel without any indication of a spiral thread, and that the trachea of the under membrane disembogues as a recurrent vessel in the axillary vein. The anal vein originates at the base of the wing from a large trachea passing through the posterior callus, and connects, beyond the basal articulation of the wing, with the trachea of the submediana and with those of the mediana through a strong loop. A straight, chitinous rod also connects the anal vein directly with the base of the median vein. By this ingenious arrangement the anal vein can be compared to a shroud, which strengthens the wing and principally the point where both wings are to be connected during flight, by bringing them into dependence upon the stronger muscles which move the principal veins originating from the anterior callus of the wing.

It is easily understood why only the anal vein of the under membrane is strongly developed. This alone has to work in keeping the hind wing in place. As the two membranes of the wing are very loosely connected one to the other, it is an apparent advantage that just the working vein is more strengthened at the expense of its not-working partner. The lock becomes even stronger by the connection of the axillary vein at the same place on the hind margin. In *Ps. venosus* the diameter of the anal vein is about 0.176 mm., and the side projection of the spiral thread about 0.039 mm.

Where the anal vein connects with the axillary vein, which is more chitinized at its end, there is a strong yellow chitinous hook, its opening about 0.333 mm. looking to the tip of the wing. At first the hook looks as if it was only the prolongation of the spiral threads, as it consists of numerous fine threads in near juxtaposition; its tip is bent, flat and transversely cut. But a closer examination shows that the hook originates, with numerous roots, from the upper margin of the axillary vein, and one stronger, straight root from the inferior margin. A transverse row of four small, horny teeth in crescent shape is placed just opposite the opening of the hook on the end of the axillary vein. It is well understood that the anterior margin of the hind wing, caught in the hook, and assisted by these teeth, will be held firmly in position. But to facilitate the catch the margin of the fore wing just opposite to the hook is bent downward, and allows the margin of the hind wing to slide in an easy manner in the hook. To make things stronger and more efficient, the point by which the hind wing is caught in the hook is just where the interior ramus (Kolbe) of the median vein originates, and I have reason to believe that not only the front margin of the hind wing, but also the median vein, is placed in the hook. At least several specimens of *Psocus* in amber show such a position.

The lock is about the same in *Psocus nebulosus* and related species. *Ps. affinis*, in amber, has numerous transverse impressions above the end of the axillary vein, forming a row of teeth to take hold of the hind wing. *Caecilius* and *Epipsocus* possess a hook similar to *Psocus*, but more pointed; *Amphientomum* has the end of the axillary vein bent up, and a tubercle on the anal vein. Probably there will be a difference in the lock of other *psocina*.

5. *Mouth-parts.*

The mouth-parts of *Psocus* were described in a satisfactory manner generally by Latreille nearly a century ago. The valuable details given recently, chiefly concerning the maxilla, have not mentioned the most interesting fact, that the inner lobe (fork, Burgess) slides in the outer lobe as in a vagina. The fact is easily ascertained in living specimens, and, if the preparations are not compressed so much as to separate the parts, in alcoholic specimens. Latreille says: "altera (parte mandibulae) externa membranacea, vaginam constituens cylindrico compressam, obtusam, apice pervio." It should be acknowledged that the figures published by Latreille are very faulty, and correspond in no way with the description. Fabricius has described the parts "maxilla cornea, elongata, linearis, apice bicrenata in vagina membranacea obtusa latens." The description given by Latreille in his Genera Crustaceorum et Insectorum is even more complete than his previous one. The ligament of the fork is attached to the stipes and is its ligament of articulation, allowing the fork to be pushed forwards; the fine membrane attached to the middle of the fork unites with the membrane of the fleshy basal part of the maxilla, permitting the fork to slide backwards and forwards through the fleshy part of the maxilla by means of a cone of muscles, just like the ovipositor in microlepidoptera. The relaxation of those muscles brings the fork and the ovipositor back, without — as far as my observations go — any help from retractor muscles. The tip of the fork slides in a horny ring of the tip of the outer lobe, which is easily broken by preparation or compression. Therefore the arrangement is similar to the arrangement in the hemiptera. Nevertheless, I confess that I know no other insect, in which the inner lobe passes through the base of the outer one and is held in position by an apical annulus. The formation of the latter can be thought to be produced by lateral teeth growing out from the outer lobe and finally surrounding the inner lobe. But it is wonderful that just this most remarkable feature, described about a century ago, and easily to be ascertained in living specimens, has been overlooked by all following observers.

Genus AMPHIGERONTIA.

Mr. Kolbe has separated four European species from the genus *Psocus* to form a new genus *Amphigerontia.* But the genus cannot stand by the characters assigned to it. The last two species have the rami venae medianae interni and submedianae externi connected in one point, the two other species have it not. The North American species have those rami either connected in a point, or not. There are specimens in which the rami are partly united as in *Psocus* (proper), and other specimens in which the ramuli venae medianae interni are divergent as in *Psocus* (proper).

1. *Psocus variegatus* Latr.

I have before me 24 specimens of both sexes from Europe, all from Germany. They live on linden and chestnut; the female appears sometimes in swarms. All my specimens show longitudinal stripes, sometimes black ones, on the front, the existence of which is denied by M'Lachlan and Kolbe. The yellow color of the pterostigma is sometimes wanting. One male from Gilgenau, Eastern Prussia, has larger orbicular eyes than the others, the space between the eyes being smaller than the diameter of the eyes. All the other males have this space larger. The legs are often so dark, that they might better be called brown. One specimen with rudimentary, smoky wings and a rudimentary venation is not a nympha (the ocelli present), but belongs to the so-called *Lachesilla* form. (M'Lachlan says *Lachesis* Westw., *Lachesilla* Hagen, but he has overlooked that *Lachesilla* is Westwood's name; cf. Generic Synopsis, Introduction, p. 47, 158.) I am not able to separate two males from Berlin Falls, N. Y., and from Dalton, Georgia, from the European species. The details are given under *Psocus moestus*.

2. *Psocus moestus* Hag., Syn. N. Am. Neur., p. 11, no: 8.—5 specimens, male and female, Mass., August. Size, color and pattern as in *Psocus variegatus*, but differs as follows:

Vertex strongly spotted with black; front almost black, with dark longitudinal stripes; antennae darker, the second basal joint with a yellow apical ring; legs brown, lighter rings around the base of the femur and on the knee; tibia darker on tip, first tarsal joint yellow. Wings darker; pterostigma without yellow; all veins and the marginal vein around the wing with alternate dark and white dots, both alike in size; a pale band, parallel to the apical margin but a little distant, runs later obliquely to the hind margin, and is finally bent upward; the part of the membrane encircled by this band is spotted as the rest but with paler brown spots; the apical half of the front margin of the hind wings has alternating dark and white dots. The middle cell is as in *Psocus* quinquangular, sometimes quadrangular.

The two males mentioned under *Psocus variegatus* do not possess the alternating dots on the margin, nor on the veins, nor on the hind wings; the femur has no pale ring on the knee, the first tarsal joint is brown; the antennae are not so dark; the pterostigma is yellow.

Three other specimens, male and female, from New England, probably from the White Mountains, are visibly larger. They look very different, and I believed them to be a new species. The wings are less dark, the pale band and the encircled part are paler and more strongly marked, forming three brown festoons on the tip of the wing; antennae paler; legs as in *Psocus moestus*, but paler; discoidal cell quadrangular. I believe they had better be left with *Psocus moestus* till other characters are known.

3. *Psocus lichenatus* Walsh, Proc. Ent. Soc. Phil., 1863, p. 188.

I possess only two types, male and female, from Rock Island, Ill.

This species is nearly related to *Psocus variegatus*, but smaller, 3-3¼ mm.; the discoidal cell somewhat quinquangular. Head yellow, less spotted with black; front yellow, with black stripes formed by a series of black dots. Antennae shorter than the wings, thicker, pilose; basal joints yellow, dark at the base; the other joints black; but on the first joints the basal half white, on the following a white basal ring. Thorax brown, all junctures yellow. Legs yellow; femur and tibia spotted with black; first joint of tarsus yellow, second one brown. Front wings brown, with three pale, not spotted fields: a large one in the middle, beginning in the upper angle of the discoidal cell and dilated triangularly towards the hind margin; the two other ones on the tip of the wing, separated above and below by a brown band; veins brown; paler yellow elongated spots near the veins, but not upon them; pterostigma brown, inner angle black; three black elongated dots in the costal space near the pterostigma; hind wings hyaline, front margin not spotted. The species appears in swarms in fall on sandstone cliffs.

I know of no other North American species belonging to *Amphigerontia*.

PSYCHE.

CAMBRIDGE, MASS., JUNE 1881.

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Works on subjects not related to entomology will not be reviewed in PSYCHE.

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PROCEEDINGS OF SOCIETIES.

LINNEAN SOCIETY OF LONDON.

3 FEB. 1881.— . . . A paper was read by Mr. A. D. Michael, entitled, Observations on the life history of *gamasinae*. In this the author endeavors to decide some of the disputed and knotty points in reference to these humble parasites; Mr. Mégnin of Versailles and Dr. Kramer of Schleusingen, both good authorities on the subject, being at variance thereon. Mr. Michael, believing that detached observations on captured specimens may have produced unreliable results, has himself bred gamasids, closely followed their changes and growth, and watched their manners, and thus has arrived at what he assumes on good grounds to be important results respecting their life-history. He states that the remarkable power of starting each mandible separately with speed and accuracy of aim far in advance of the body, the powerful retractile muscles attached to these mandibles, the organization of the remainder of the mouth, the extreme swiftness of the creatures, the use of the front legs as tactile organs only, and not for the purpose of locomotion, and the ample supply of tactile hairs in front only, seem to fit the animals for a predatory life, and point to habits similar to those of *Cheyletus* and *Trombidium*, rather than to those of the true vegetable-feeders, such as the *oribatidae* and *tetronychi*. He further concludes: 1, that Mégnin is correct in saying *Gamasus coleoptratorum*, and other allied creatures, with the conspicuously divided dorsal plates, are not species at all, but are immature stages of other species; 2, that the division of the dorsal plate is, in most cases at all events, a question of degree, and does not form a sound basis for classification, as applied by Koch, Kramer and others; 3, that the dorsal plates do not grow gradually, but alter in size, shape, or development of the ecdysis; 4, that Mégnin is right in saying that the characteristic of the so-called *G. marginatus* is simply a provision possessed by the females of a large number of species; 5, that the extent of the white margin depends upon the extent to which the abdomen is distended by eggs; 6, that Mégnin is in error in saying that *G. coleoptratorum* is the nymph of *G. crassipes*. The nymph of *crassipes* does not show any divided dorsal plates which can be seen on the living creature; 7, that in the species bred there has not been observed any inert stage before the transformations or ecdysis; 8, that in the same species copulation takes place with the adult female and not with the immature one, as Mégnin contends, and that it is by the vulva not the anus.—*Zoologischer Anzeiger*, 28 Mar. 1881, jahrg. 4, no. 79, p. 167-168.

ZOOLOGICAL SOCIETY OF LONDON.

15 FEB. 1881.— . . . The Rev. O. P. Cambridge, C. M. Z. S., exhibited and made remarks on a hymenopterous parasite, hatched from larvae found on two spiders, *Linyphia obscura*, Blackw. ♀ and *L. zebrina*, Menge ♂. The larvae were stated to be apodous, and to adhere to the abdomen of the spider, which, when full grown, they fully equalled in size. Lord Walsingham read a paper on some new and little known species of North American *tineidae*, amongst which were three new generic forms. — *P. L. Sclater*, in *Zool. Anzeiger*, 7 March 1881, p. 117–118.

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [ ], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

Corrections of errors and notices of omissions are solicited.

Coquillett, Daniel W: Description of the larva of *teras permutana*. (Papilio, 19 Feb. 1881, no. 2, v. 1, p. 30.) *H: E.* (2311)

Coquillett, Daniel W: On the early stages of some moths. (Papilio, 15 [20] Jan. 1881, no. 1, v. 1, p. 6-8.)

Describes larvae of *apatela americana*, *a. lobeliae*, *a. falcula*, *a. superans*, *arctia virguncula*, *catocala fratercula*, *c. amica*, *mamestra trifolii*, *eustrotia carneola*, *pyrrhia angulata*, *tarache erastroides*. *H: E.* (2312)

Edwards, H: Descriptions of two new species of *lithosidae*. (Papilio, 15 [20] Jan. 1881, no. 1, v. 1, p. 12.)

Describes *nola anfracta* (California), and *crocota ostenta* (Arizona). *H: E.* (2313)

Edwards, H: New genera and species of North American *noctuidae*. (Papilio, 19 Feb. 1881, no. 2, v. 1, p. 19.)

Describes new genera *euros* and *oribates*, and the following 22 new species and varieties: *euros proprius* (Cal.), *lygranthoecia walsinghami* (Oreg.), *adonisea pulchripennis* var. *languida* (Cal.), *melicleptria belladonna* (Utah), *m. elaborata* (Col.), *m. perminuta* (Cal.), *oribates muirii* (Cal.), *o. limbatus* (Mazatlan), *annaphila aurantiaca* (Cal.), *a. pustulata* (Ariz.), *tarache sedata* (Ariz.), *fruva acerba* (Cal.), *f. accepta* ♂ ♀ (Fla.), *litocala sexsignata* var. *deserta* (Col., Ariz.), *syneda seposita* (Col.), *s. hastingsi* var. *perpallida* (Cal.), *s. adumbrata* var. *saxea* (Cal.), *melipotis tenella* ♂ ♀ (Tex.), *synedoida sabulosa* (Col.), *s. inepta* (Col.), *s. morbosa* (Col., etc.), *homoptera rubi* (Cal.). Re-names *annaphila arvalis*, calling it *a. salicis*, owing to preoccupation of the name *arvalis* in the allied genus *axenus*. *H: E.* (2314)

Edwards, H: On two new forms of the genus *parnassius*. (Papilio, 15 [20] Jan. 1881, no. 1, v. 1, p. 2-4.)

Describes *parnassius thor* n. sp., from Yukon River, Alaska, and *p. hermodur* n. var. of *p. smintheus*, from Colorado. Compares *p. thor* with *p. eversmanni*, and *p. hermodur* with *p. corybas*. *H: E.* (2315)

Edwards, W: H: Capture of *diadema bolina*, Linn. in Florida. (Papilio, 19 Feb. 1881, no. 2, v. 1, p. 30.)

Notices the capture of *d. bolina* for the first time in the United States. Mentions also the capture of *pieris ilaire*, *callidryas agarithe*, *lycaena cassius* and *l. ammon* at Indian River, Fla. *H: E.* (2316)

Goodell, Lafayette Washington. On the larvae of two noctuids. (Papilio, 19 Feb. 1881, no. 2, v. 1, p. 15.)

Describes the larvae of *charadra propinquilinea* and *mamestra assimilis*, giving notes of food plants. *H: E.* (2317)

Grote, A: Radcliffe. Description of four new species of moths. (Papilio, 15 [20] Jan. 1881, no. 1, v. 1, p. 4.)

Describes *scepsis edwardsii* (Fla.), *parasa fraterna* (N. Y.), *mamestra sutrina* (Col.), *catocala dulciola*, (Ohio). *H: E.* (2318)

Hagen, Hermann August. The Hessian fly not imported from Europe. (Can. entom., Oct. 1880, v. 12, p. 197-207.)

Abstract. (Can. entom., Sept. 1880, v. 12, p. 171.)

Considers that the so-called "Hessian fly" [*cecidomyia destructor*] in the United States was not imported from Europe: conclusions are "1. That it is impossible that the fly could have been imported by Hessian troops; 2. That it is very probable that the fly was here before the [Revolutionary] war; 3. That the fly was not known to exist in Germany before 1857." *G: D.* (2319)

Hagen, Hermann August. On some insect deformities. (Mem. Mus. compar. zoology, v. 2, no. 9.) Cambridge, March 1876. t.-p. cover, 23 p., 1 pl., 30×21, t 21×12.5.

Treats of several perfect insects with larval head, of precocious development of the larva of *bombyx mori* directly into the imago, and of deformity of the elytra in *strategus* (*geotrupes*) *julianus* and in *prionus coriarius*. *G: D.* (2320)

Harrington, W: Hague. Entomology for beginners. Some fungi-eaters. (Can. entom., Dec. 1880, v. 12, p. 258-262.)

Notes on *megalodacne heros*, *bolitotherus cornutus*, *diaperis hydni*, *hoplocephala bicornis*, *mycetophagus punctatus*, *triplax thoracica*, *penthe pimelia* and *p. obliquata*; notes on larvae of some of the species. *G: D.* (2321)

Harvey, F. L. Voraciousness of *chordeiles popetue* Baird. (Amer. nat., Dec. 1880, v. 14, p. 896.)

Found over 600 insects in the crop of a night hawk (*c. popetue* [=*c. virginianus*]); recommends encouraging this bird as an insect-destroyer. *G: D.* (2322)

Hemmerling, Hermann. Ueber die Hautfarbe der Insecten. Inaugural-Dissertation . . . Bonn, 1878. 27 p., 21.5×14, t 16×9.

Literature used in preparing the dissertation (19 titles); coloration of vertebrates; structure of the external covering of insects; the colors of the external covering and the different modes by which the coloration can be produced; special studies on the coloration of the *rhynchophora;* colors of other groups of animals, which are produced by similar skin-secretions. *G: D.* (2323)

Howard, Leland O. Two new species of *eupelmus*, with remarks upon *e.* (*antigaster*) *mirabilis*, Walsh. (Can. entom., Oct. 1880, v. 12, p. 207-210.)

Describes *e. reduvii*, reared from eggs of *reduvius novenarius*, and *e. floridanus*, parasitic on a tineid larva from Florida. *G: D.* (2324)

Insect-destroying fungi. (Amer. nat., Jan. 1881, v. 15, p. 52-53.)

Rev. and abstract of A. Giard's "Deux espèces d'*entomophthora* nouvelles" . . . [Rec., 1656]. *G: D.* (2325)

Insect enemies of the rice plant. (Amer. nat., Feb. 1881, v. 15, p. 148-149.)

Notes on *chalepus trachypygus*, *spalacopsis suffusa (?)*, *centrinus concinnus*, and *cecidomyia oryzae*, which injure rice [*oryza*]. *G: D.* (2326)

Jewett, H: S. Notes on lepidoptera. (Can. entom., Nov. 1880, v. 12, p. 228-231.)

Notes on larvae of *euchaetes collaris*, and *e. egle*. Food plants of a few other lepidopterous larvae. *G: D.* (2327)

K[atter], F. Ueber die Lebensweise von *silpha opaca*. (Entom. Nachrichten, 1 Feb. 1881, jahrg. 7, p. 52.)

Larva and imago eat vegetable matter. *G: D.* (2328)

Liegel, Hermann. Uber den Ausstülpungs-Apparat von *malachius* und verwandten Formen. Inaugural-Dissertation . . . Göttingen. Hannover [n. d., ! since 1858]. 31 p., 1 pl., 21×15, t 16×10.

Anatomy of the evaginatable appendages of *malachius* and allied genera, based on study of *m. aeneus*, *anthocomus fasciatus* [*corr.*] and *cantharis fusca*. The evaginatable appendages of *m. aeneus* (figured) are evaginated by filling with fluid from the body-cavity and retracted by muscles. *G: D.* (2329)

Lintner, Joseph Albert. The "army worm" invasion of northern New York. (St. Lawrence republican . . . [Ogdensburg, N. Y.], 8 June 1881, v. 51, no. 31, p. [1], col. 7-9, 198 cm.)

Account of the ravages of the "grass-cutter," *nephelodes violans*, in northern N. Y., in May 1881; habits, ravages and parasites of, and means against the true "army-worm," *leucania unipuncta;* notice of previous accounts of the *nephelodes*. *B: P. M.* (2330)

List of the butterflies found at Potsdam, N. Y. (A). (Can. entom., Feb. 1881, v. 13, p. 40.)

Enumerates 20 species, with brief notes. *G: D.* (2331)

Mangerel, Maxime. La chasse aux coléoptères en automne. (Feuille des jeunes naturalistes, 1 Nov. 1880, an. 11, p. 14-15.)

Recommends collecting coleoptera in autumn by the umbrella process, on wood piles and dead wood. *G: D.* (2332)

Meehan, T: Bees and flowers. (Bull. Torrey bot. club, June 1880, v. 7, p. 66, 10 cm.)

Records the perforation of the spurs of *aquilegia* by humble-bees (*bombus*). *G: D.* (2333)

Meehan, T: Fertilization of *aquilegia*. (Amer. nat., Feb. 1881, v. 15, p. 134–135.)

Thinks pollen-hunting insects fertilize *aquilegia*. *G: D.* (2334)

Mik, Josef. Ueber das Präpariren der Dipteren. (Verhandl. der k.-k. zool.–bot. Gesells. in Wien, jahrg. 1880, bd. 30, p. 359-378.)

Separate, Wien, 1880. 20 p. [p. 359-378], 23×15, t 17×10.5.

Notice. (Zool. Anzeiger, 13 Dec. 1880, jahrg. 3, p. 601.)

General direction how to collect and prepare diptera; principal points are, the middle dorsal line must remain perfect, diptera must not be killed with alcohol, killing with potassic cyanide [KCN] not recommended, very small diptera should not be killed when they cannot be pinned immediately, too much material should not be collected in the net at one time, hairy diptera (such as *bombylidae*) should not be taken in the hand to pin, lacquered iron needles or lacquered iron wire to be used for pinning instead of common pins or silver wire (which contain copper, and are therefore liable to corrode), never use too large pins, use wire for all diptera under 3 mm. long, never pin in an unpaired part of an insect, never pin minute diptera in the dorsal side, but pin them in the mesosternum between the middle and hind thigh of the left side, diptera should not be glued upon paper or imbedded in resin, and should not have their wings spread; hints on labelling diptera, on pinning them in boxes, and on packing them to send; descriptions of different apparatus convenient in collecting diptera. *G: D.* (2335)

[**Mixture** of carbolic acid and olive oil for mosquito-bites.] ("Southern clinic.") (New remedies, Feb. 1879, v. 8, p. 63, 2 cm.) (Psyche advertiser, March 1879, p. 7.)

Germ. tr. (Entom. Nachrichten, 1 July 1879, jahrg. 5, p. 176.) *G: D.* (2336)

Molin, Rafael. Das Leben und die rationelle Zucht der Honigbiene . . . [Rec., 2039].

Rev., by Sauppe, under title "Von Köln." (Deutsch. Bienenfreund, 1 Feb. 1881. jahrg. 17, p. 45-46.) *G: D.* (2337)

ENTOMOLOGICAL ITEMS.

Mr. C. Zeiller, Post-secretary in Lüneburg, Hannover, Germany, offers coleoptera and lepidoptera in exchange for American species.

Mr. Theodor Steck, of Bern, Switzerland, has been appointed Entomological Assistant at the Municipal Zoological Museum of Bern, in place of Mr. Albert Müller, who has retired from the position on account of ill health.—*Zool. Anz.*, 27 June 1881, jahrg. 4, p. 340.

Prof. Dr. J. Speerschneider, Custodian of the "Fürstliche Schwarzburgsche Naturaliencabinet" in Thüringen, Germany, wishes to enter into relations of correspondence with entomologists of North America and other countries, with a view to exchange of specimens.

Mr. Albert Müller, Curator of the Natural History Museum and Librarian of the Swiss Entomological Society, of Bern, Switzerland, has collected a large amount of material supplementary to Hagen's *Bibliotheca entomologica*, a part of which he has already published. Dr. Hagen himself has in manuscript the main part of the record necessary to bring his volumes down to 1868.

Dr. A. S. Packard, jr., of Providence, R.I., wishes to obtain specimens of the eggs of *Oecanthus*. "They are laid in the terminal branches of the raspberry, plum, oak, grape, and almost any shrubs. The rows of punctures made by the ovipositors of the female are quite easily detected, and may be found during the autumn and winter. Send twigs by mail."

N. Nassonow, of Moscow, gives as the results of his investigations into the anatomical structure and post-embryonal development of ants, 1. that the integuments of the head of the imago appear as new formations, while those of the thorax and abdomen are directly derived from the larval stage; 2. that in the organs of the head and thorax no destructive processes, but only transformations, are to be observed. — *Zoologischer Anzeiger*, 5 Apr. 1880, jahrg. 3, p. 162–163.

SOCIETY MEETINGS.

The regular Meetings of the Cambridge Entomological Club will be held at 7.45 p.m., on the days following:—

14 Oct. 1881.
11 Nov. "
9 Dec. "
13 Jan. 1882.
10 Feb. "
10 Mar. 1882.
14 Apr. "
12 May "
9 June "

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following: —

26 Oct. 1881.
23 Nov. "
28 Dec. "
25 Jan. 1882.
22 Feb. 1882.
22 Mar. "
26 Apr. "
24 May "

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following:—

14 Oct. 1881.
11 Nov. "
9 Dec. "
13 Jan. 1882.
10 Feb. "
10 Mar. 1882.
14 Apr. "
12 May "
9 June "

James H. Ridings, *Recorder.*

The semi-annual meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following:—

12 Dec. 1881.
12 June 1882.

James H. Ridings, *Rec. Sec'y.*

The regular monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following:—

6 Sept. 1881.
4 Oct. "
1 Nov. "
6 Dec. "
3 Jan. 1882.
7 Feb. "
7 Mar. "
4 Apr. "

G: H. Bowles, *Secretary.*

PRIZE ESSAYS.

Due 15 Oct. 1882.—Life-histories of *Sclerostoma syngamus* and of *Strongilus pergracilis*. See Psyche, v. 3, p. 59.

ADVERTISEMENTS should reach the editors by the 10th of the month preceding the one in which they are to appear.

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J. HENRY COMSTOCK,
Department of Agriculture,
Washington, D. C.

No. 85 was issued 4 Nov. 1881.

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Vol. 3. No. 87-89.

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PSYCHE.

ANATOMY OF THE MOUTH-PARTS AND OF THE SUCTORIAL APPARATUS OF *CULEX*.*

BY GEORGE DIMMOCK, CAMBRIDGE, MASS.

(*With Plate I.*)

From early times the mosquitoes, *Culex* of different species, have attracted the attention of mankind, and many attempts have been made to settle various points of their anatomy and life-history. Of their anatomy nothing is, perhaps, of more interest than a study of their proboscis. While the importance of the mouth-parts in the classification of insects remained undiscovered until Fabricius, in the last century, made them a basis for dividing the insects into classes and genera, considering that they furnished "sufficient and constant characters, and far more natural genera;"[1] and their homological significance remained a mystery until Savigny,[2] in 1816, showed that the mouth-parts of all insects were reducible to the same general plan as those of chewing insects, and that these mouth-parts were the serial homologs of locomotory appendages; yet, previous to the before-mentioned dates, a number of anatomists, attracted, probably, as much by the minuteness of the objects and the difficulty of the work as by the popular interest which the mosquito excites, sought to complete our knowledge of the number, position and use of the mouth-parts of this insect. The earliest of these anatomists whose work is worthy of note is Swammerdamm, who studied *Culex* in 1668.[3] The difficulty of the work which Swammerdamm undertook, with the crude apparatus at that time at his command, can be easily comprehended when we consider that the proboscis of the female of most species of *Culex* has about the diameter of a hair from the human head, that is, a diameter of about one tenth of a millimetre; that it is composed (*see* pl. 1, fig. 8) for the most part of the sheath, within which are six so-called setae, later to be more fully described; and that these setae are of transparent chitin, one of them being so transparent and delicate that it has often been overlooked by later naturalists. Swammerdamm determined correctly the number of setae in the proboscis of the female, but he, erroneously, evidently supposed that the proboscis of the male had the same number of setae as that of the female. He erroneously thought the setae to be capable of protrusion from the end of the sheath, without flexion of the latter, and that the largest of the five setae formed an inner sheath for the other four. He writes (p. 147) in quaint old style, "I consider that these five setae serve, like so many sharp little awls, to make the opening in the sweat-pores of the skin. When this is done they are drawn back again into the inner sheath. This then enters (according to my idea) into the wound with its sharp cavity, and the mosquito sucks through it the blood, which ascends alongside of and between the little setae into the belly of the mosquito."

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* Extract, with additions and changes, from "The anatomy of the mouth-parts and of the sucking apparatus of some diptera. Dissertation for the purpose of obtaining the philosophical doctorate at the Leipzig University, by George Dimmock, of Cambridge, Mass., U. S. A. Boston, A. Williams & Co., 1881." t.-p. cover, t.-p., 50 [+10] p., 4 pl., 24.5×19, t 12.5×17.

[1] Fabricius, J. C. Systema entomologiae, ... 1775. Preface.

[2] Savigny, J. C. Mémoires sur les animaux sans vertèbres. I. partie, I. fascicule. Mém. I.–II. ... 1816.

[3] Swammerdamm, J. Bybel der natuure ... 1737-1738. [I have used the German editionof 1752.]

Leeuwenhoek, according to Réaumur, found only four setae in the sheath of the proboscis, and considered that the inner sheath, described by Swammerdamm, was a channel, and not a closed tube. Barth,[4] whose dissertation I have lately examined, thought the inner sheath was a closed tube. Réaumur,[5] in 1738, published a long description of the mouth-parts of *Culex*, and described with great accuracy its mode of biting. Réaumur found only five of the six setae which the proboscis contains. He favored the idea that the inner sheath, which Swammerdamm had described, was not cylindrical, but only a channel open on one side. Réaumur also arrived at the idea that the maxillary palpi of *Culex* could, in some cases, help to form the sheath which encloses the setae, but he does not clearly say that they always do so in the males.

Since Réaumur's time but little has been added to our knowledge of the mouth-parts of *Culex*, some writers following the statements of Swammerdamm, others those of Réaumur, or of Leeuwenhoek, in regard to the number of setae. Among others I will cite Sulzer,[6] who says, "four to five pointed tubules;" Fabricius,[1] who writes, "sheath exserted, univalvular, flexible, with five setae;" Jördens[7] describes four setae; Gravenhorst,[8] "The proboscis long, setiform, five-parted;" Meigen[9] describes four setae and figures five; Gerstfeldt,[10] "The sheath is formed of the under lip alone, and contains six setae;" Packard,[11] "These six bristle-like organs are folded together within the hollowed labium;" Claus [12] writes, proboscis "extended with four setae;" Muhr[13] figures six setae.

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[4] Barth, J. M. Dissertation de culice ... 1737.

[5] Réaumur, R. A. F. Mémoires pour servir à l'histoire des insectes. ... [Edition 1737–1748, t. 4, part 2.]

[6] Sulzer, J. H. Die Kennzeichen der Insekten ... 1761.

[7] Jördens, J. H. Entomologie und Helminthologie des menschlichen Körpers ... 1801.

[8] Gravenhorst, J. L. C. Grundzüge der systematischen Naturgeschichte ... 1817.

[9] Meigen, J. W. Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten ... 1818–1838.

[10] Gerstfeldt, G. Ueber die Mundtheile der saugenden Insecten ... 1853.

[11] Packard, A. S., Jr. Guide to the study of insects, ... 1869.

[12] Claus, C. Grundzüge der Zoologie ... 1876.

[13] Muhr, J. Die Mundtheile der Insekten dargestellt auf 5 Wandtafeln ... 1878.

The unsettled state of our knowledge of the anatomy of the mouth-parts of *Culex*, as can be seen by the preceding notes, led me to select this genus of diptera for careful study, with the results noted in the following pages.

IN THE FEMALE.

The mouth-parts which form the proboscis of the female *Culex*, as I have found them by study of *C. rufus*, *C. ciliatus* and *C. pipiens*, consist of a labrum (pl. 1, fig. 1, *lr*), an epipharynx (*e*), a hypopharynx (*h*), two mandibles (*m*), and two maxillae (*mx*), all sheathed, when in repose, in the labium (*l*), which receives them into a groove on its upper side. Each maxilla has a maxillary palpus (*mp*), which lies outside the labium; the latter has no palpi. The labium and maxillary palpi are covered with hair and scales; the other mouth-parts are naked, light brown, setiform and transparent; they all originate at the anterior basal portion of the head, and are, with the exception of the maxillary palpi, of about equal length, that is, about three to four times the length of the head. The maxillary palpi, in the females of *Culex* proper, are about the length of the head. The scaleless mouth-parts are not jointed, and are the ones which penetrate the skin in biting. The labrum and epipharynx are united in their whole length, forming a piece which is shown in section in fig. 6, *d*. The other mouth-parts are free to the base. A pumping organ, trianguloid in cross-section (fig. 10, *b*), is formed by a dilation of the oesophagus behind the oesophageal nerve-ring. Each of the above-mentioned parts will be described more in detail later. In comparative size and strength the mouth-parts would be arranged as follows, the largest and stoutest first: labium, labrum-epipharynx (the name by which I designate this compound piece in diptera), hypopharynx, maxillae and mandibles.

The general arrangement of the mouth-parts, relative to each other, is shown best in fig. 8, which is a figure of a cross-section through the middle of the proboscis of a female *Culex rufus*, while in repose, with the setae sheathed in the labium. The labium (*l*), clothed on the outer side with its scales and hairs, is wrapped nearly around the other mouth-parts. In it lie the two maxillae (*mx*), partly enclosing the parts above them, and thus helping to bind the parts together; above the maxillae are the two mandibles (*m*), and immediately above the mandibles, in the median line, is the hypopharynx (*h*), with a thickened middle portion. Resting on the hypopharynx is the labrum-epipharynx; the epipharynx (*e*), is omega-form in section, and above it, delicately attached, is the labrum (*lr*). The changes in relative position which the mouth-parts of *Culex* undergo as they approach the head can be best described in the subsequent description, in detail, of each separate part.

The labrum-epipharynx (figs. 1, 5, 6, 7-8; *lr* and *e*) of *Culex* consists of the thin labrum resting upon and fastened to the epipharynx; it tapers gradually from base to apex. The epipharynx is omega-form in cross-section, being a channel rather than a tube, a tube being formed by the pressing of the hypopharynx upon its under side. The tube thus formed is the channel through which the blood, which *Culex* sucks, passes into the pharynx. At its base or proximal end the epipharynx is supported and moved by strong muscles having their insertions on the upper side of its wings or lateral portions, and upon the upper side of its tube. These muscles extend upward and posteriorly, and have their origin on the inner surface of the clypeus. (See figs. 9 and 11.) These muscles (*pm*), by their contraction, elevate, and perhaps slightly retract, the epipharynx and the labrum to which they are attached. These muscles probably *aid* in suction for when the setae are all stuck firmly in the skin, the contraction of these muscles would only serve to raise the base of the epipharynx from that of the hypopharynx; this action would tend to produce a vacuum between the two (see fig. 9), and thus cause the blood to be drawn up in the tube of the epipharynx. The probability that these muscles aid in suction is augmented by the fact, the explanation of which I have more fully developed in the part of my dissertation devoted to a comparison of the mouth-parts and suctorial apparatus in the different families of diptera upon which I have worked, that the corresponding muscles are devoted to suction in other flies, which cannot raise their epipharynx from their other mouth-parts so freely as is seen in fig. 1, and further, that in the male *Culex*, which does not possess — as does the female — a pumping apparatus behind the oesophageal nerve-ring, these muscles are the ones that must serve for suction. The section represented in fig. 9 was taken near the base of the clypeus; a few sections further on, posteriorly, the channel for the passage of food turns upward and then backward again, passing in its course a place (fig. 11, *v*) where its walls approximate dorsally and ventrally. This narrowing of the walls is probably a valve to prevent the return of fluids to the mouth during the pumping process. The pharynx with its surrounding muscles in *Culex* is the equivalent of what has been termed the fulcrum in *Musca*. Macloskie[14] writes of the fulcrum, "It seems to be general in diptera; even the mosquito possesses it," but he does not further describe it, in other diptera than *Musca*.

The tip of the labrum-epipharynx seems to turn upward (fig. 1, *lr-e*), although the opening is upon the ventral surface, as may be seen in fig. 6, *b*, which represents the ventral view of the tip of this part. The tip of the labrum-epipharynx is comparable to a quill-pen with three tips near each other, the middle one of these three tips being slightly shorter than the other two. The two lateral portions of the epipharynx, as seen in section, when they near the tip, lay themselves closely upon the sides of the tubular portion, passing upward upon it. as seen in fig. 5, *lr-e;* they thus serve to strengthen the two outer points of the tip of the epipharynx, while the labrum continues to a sharp point at the tip, and, united with the upper surface of the epipharynx tube, forms the middle point of the tip. The channel, or slit, along the under side of the epipharynx, widens toward the tip (fig. 6, *b*), leaving thus an opening for the passage of fluids into the tube of the epipharynx.

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[14] Macloskie, G: The proboscis of the house-fly. (Amer. naturalist, March 1880, v. 14, p. 153–161, fig. 1–3.)

The labrum itself is a thin lanceolate lamella of chitin, concave along the under side from the basal portion to the tip, and its concavity rests upon and fits to the convexity of the tubular part of the epipharynx, to which it is so lightly attached that they readily separate by application of caustic potash. The outer edges of the labrum roll slightly inward toward the epipharynx along most of its length. (See fig. 6, *d*.) At its base the labrum sends a chitinous support beneath the clypeus, where it separates more from the epipharynx and has its own muscles, indicating that the labrum has a degree of motion independent of the epipharynx, a motion allowed, perhaps, by the elasticity of the connection between the labrum and epipharynx. The muscles of the labrum (fig. 9, *pm'*) are inserted upon the upper side of its base and have their origin on the inner surface of the roof of the clypeus. These muscles are, at least in the females of *Culex rufus*, divided into three portions in their upper part, as shown in fig. 9.

The hypopharynx of the female of *Culex* is a linear, lanceolate, transparent lamella of chitin, with a longitudinal rod through the middle, the nature of which will be discussed later. At its base the hypopharynx forms the continuation of the under wall of the pharynx. (See fig. 11, *h*.) The hypopharynx is closely pressed upon the under side of the epipharynx, completing the tube nearly formed by the epipharynx. No muscles have their insertion on the base of the hypopharynx. Its tip is simply lanceolate (fig. 5, *h*). In *Culex pipiens* and *C. rufus* nothing further is visible (with a magnifying power of five hundred diameters), in sections of the thicker middle portion of the hypopharynx, than a simple rod of chitin; but, in *C. ciliatus*, a North American species of which the mouth-parts are larger, this rod appeared to be tubular. Is it a rod or is it a tube? Menzbier[15] writes (p. 25) that in diptera "neither the labrum nor the hypopharynx possesses a completed tube, but only a channel" which leads into the salivary duct. That Menzbier is incorrect in affirming that the hypopharynx has no complete tube I have clearly proved in my observations on *Bombylius* and *Eristalis;* but the question still remains unsettled whether *Culex* has any passage, either tube or groove, through the hypopharynx. Réaumur[5] (tome 4, part 2, p. 396) discusses the probability of a poisonous fluid being secreted by *Culex*, to cause the blood to flow more readily when it bites, and since his time writers have, on the one hand, accepted this statement, without proving the presence of such a fluid or of the glands to secrete it, or they have, on the other hand, denied the existence of such a fluid, and affirmed, as Leeuwenhoek did, that the swelling subsequent to the bite of *Culex* was due to the irritation produced by the tearing of the mouth-parts in the skin, without the aid of a poisonous secretion. After having experimented a large number of times with the living mosquito, I am convinced that there is use made of a poisonous saliva; for, when biting, if the mosquito fails to strike blood, which it often does on parts of the back of my hand, it may have inserted its proboscis (labium of course excepted), nearly full length, in from one to six directions, in the same place, and withdrawn its proboscis; indeed it may have inserted its proboscis, as often occurs, in extremely sensitive parts; yet in such cases, if no blood be drawn, no more effect is produced upon my skin than is produced by the prick of a sharp needle; a red point appears only to disappear in a few hours. Certainly there has been as much tearing of tissues in such a case as the above-mentioned, as there is when *Culex* settles on a place richer in blood, and, with a single probing, draws its fill. When the insect is allowed to draw its fill on the back of my hand, the subsequent swelling lasts from forty to forty-eight hours, and the amount of poisonous effect upon me, as proved by numerous experiments, is in direct proportion to the length of time which the *Culex* has occupied in actually drawing blood. The above-mentioned facts would indicate a constant outpouring of some sort of poisonous fluid during the blood-sucking process, and would necessitate a tube or channel for its conduction. Now no other channel exists through which saliva could pass from the base to the tip in the mouth-parts which *Culex* inserts in the skin, and this, together with the position occupied by the salivary duct in other diptera, leads me to believe, without as yet being able to give anatomical proof for it, that the hypopharynx of *Culex* contains a duct that pours out its poisonous saliva. Having no fresh specimens of *Culex ciliatus*, and the extreme minuteness of the hypopharynx in the species of *Culex* available, has precluded my determination of the actual presence of glands in connection with this mouth-part.

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[15] Menzbier, M. A. Ueber das Kopfskelet und die Mundwerkzeuge der Zweiflügler. (Bull. Soc. impér. natur. de Moscou, 1880, t. 55, no. 1, p. 8–71, tab. 2–3.)

The mandibles (figs. 1 and 8, *m*), the most delicate of the mouth-parts of *Culex*, are two very thin linear-lanceolate lamellae of transparent chitin, which rest with their inner edges beneath each half of the hypopharynx, their outer edges projecting beyond its outer edge, on each side. At the base of the proboscis they appear to have no muscular attachments. They are slightly tapering from the base to the tip, but are of equal thickness throughout their breadth; at the tip they have a slight thickening, in form of a letter V, with its opening turned toward their very delicate, almost invisible tip. (See fig. 5, *m*.)

The maxillae (mistaken by Gerstfeldt[10] for the mandibles, but correctly figured by Muhr[13] on his diagram as maxillae) are tapering lamellae of chitin, apparently serrate at the tips. Each maxilla is thicker near the inner edge, the thickening being formed by a solid chitinous shaft, which is fixed longitudinally upon the upper side. (See fig. 5 and 8, *mx*.) The bases of the maxillae join the stouter maxillary palpi just before passing under the clypeus, and immediately afterwards they join the labium, and become imbedded, with the mandibles, in connective tissue. (See fig. 9, *mx.*) Their continuations in the head are two delicate chitin-supports, each of which ends in a strong muscle; this muscle, the retractor maxillae (fig. 10, *rm*), passes backward and downward through the head, beneath the infraoesophageal ganglion, and has its origin in the posterior basal part of the head. The maxillae probably have no protractor muscle, their forward motion being due to the elasticity of the chitin frame-work of the head. The shaft of the maxillae is very transparent, except near the inner side where the chitin-rod runs; here it is brownish and more opaque. Out from the above-mentioned chitin-rod extends a very delicate feathering, or corrugation, of chitin to the edge of the most transparent portion of each maxilla, as seen upon the basal portion of fig. 5, *mx.* The tip of the maxillae (fig. 5, *mx*) is very acute, has none of the before-mentioned chitinous corrugations, but, in their place, near the outer edge, is a row of papillae, which have their tips slightly recurved toward the head, and consequently appear serrate. These papillae are upon the upper surface of the maxillae, as can be readily seen, by preparing the mouth-parts by lateral pressure, as in fig. 1.

The maxillary palpi (figs. 1, 2, and 9, *mp*) are four-jointed in some species of *Culex*, five-jointed in others. At first sight they appear to be three-jointed, but more careful examination serves to show that the apparent basal joint is made up of two joints, and oftentimes to reveal a very short, knob-like joint at the extremity of what appears to be, at first, the apical joint. At their base the maxillary palpi join the maxillae just before the latter pass beneath the clypeus, and, with the maxillae, join the other mouth-parts, as shown, in section, by fig. 9.

The function of the maxillae is, probably, to draw the other mouth-parts into the skin, when *Culex* bites, for if one watches the maxillary palpi of *Culex*, while the setae are entering the skin, the setae seem to pierce the skin, and enter it with a slow gliding motion, as if drawn from below, instead of pressed from above: meanwhile, if one observes carefully, with a lens, the maxillary palpi can be seen to be in an alternating motion, as if the maxillae to which they are attached, pressed, first one then the other, into the skin, and then pulled the other parts after them. The muscles, retractores maxillarum, already described, lend weight to this view of the functions of the barbed maxillae.

The labium (figs. 1, 2, and 3, *l*), the largest of the mouth-parts of *Culex*, and the only one of them, helping form the proboscis, which contains muscles, forms a sheath opening along the upper side, and receiving in its channel the other mouth-parts (excepting the maxillary palpi), as seen in cross-section in fig. 8; it tapers from base to tip, is flexible, has a delicately annulated structure, and is clothed with hair and scales. At its base it unites with the maxillae, mandibles, and hypopharynx, and continues into the under surface of the head. Throughout its length it contains, on each side, muscles, which have their origin in the base of the head and serve to control the motions of the labium. (See figs. 8 and 9, *ml.*) At the sides of the tip of the labium are attached two lobiform appendages, the labellae, which are seen at *lb* in fig. 3 with the true tip of the labium proper between them. These terminal lobes are jointed to the labium, a little distance behind its tip, as can be seen in fig. 7, which is a cross-section of the labium a trifle anterior to the actual centre of motion of these joints. The section of that portion of the labium which extends forward to form its tip is seen in the middle of the figure, just below the section of the maxillae (*mx*). Outside the section of each lobe is seen the section of a portion of the exterior edge of the labium itself, which here forms a double socket, or pair of acetabula, into which the heads of the two labellae are set. Each of the lobes of the labium, — the labellae, — is provided with an extensor and flexor muscle (fig. 7, *me*, and *mf*), and is attached to the labium by a true joint.

The labium has for function, for the most part, the protection of the fine setae which form the true piercing organ of *Culex*. In the females of *Culex* proper, the protective sheath is formed by the labium alone. When the mosquito has found a place which suits its taste for piercing, it plants its labellae firmly upon the spot, and a moment later the labium flexes backward in its middle, the setae, firmly grouped together, remain straight and enter the skin, while the two labellae guide them, much as a carpenter guides his bit with his fingers, while boring a piece of plank. When the setae of *Culex* have entered the skin to nearly their full length the labium is bent double beneath the body of the insect, the labellae still holding the base of the setae at the point where they enter the skin. When the mosquito wishes to withdraw the setae it probably first withdraws the two barbed maxillae beyond the other setae, that is, so that their barbs, or papillae, will be kept out of action by the mandibles and hypopharynx; then it readily withdraws the setae, perhaps aiding their withdrawal by the muscles of the labium, for, during the process of extracting the setae from the skin, while they are slowly sinking back into the groove upon the upper side of the straightening labium, the mosquito keeps the labellae pressed firmly upon the skin.

The mouth-parts of *Culex*, as above described, are suspended under a clypeus, or epistom, which is figured from the side in fig. 1, *c;* from above in fig. 2, *c;* in length-section in fig. 11, *c;* and in cross-section in fig. 9, *c*. This clypeus is the hood-shaped forward continuation of the lower part of a λ-shaped piece of chitin which forms the framework of what may be termed the "face" of *Culex;* right and left of the upper portion of this framework pass out the antennal nerves, the antennae being supported by the framework itself.

The pharynx (fig. 11, *p*), the tubular continuation of the epipharynx above and the hypopharynx below, as it passes backward, beneath the centre of the λ-shaped framework, turns somewhat upward, is narrowed to the valve previously described, then widens slightly again, and, as oesophagus (fig. 11, *oe*) passes through the oesophageal nerve-ring, in which it is supported by three delicate chitinous rods, which lie, one longitudinally on its ventral surface, and two to the right and left on its dorsal surface. Just posterior to the oesophageal nerve-ring, directly above the nerve-commissure which connects the infraoesophageal ganglion with the first thoracic ganglion, the oesophagus suddenly expands into an oesophageal pump, or bulb, the longitudinal section of which is shown in fig. 11, *b;* the cross-section in fig. 10, *b.* This bulb, which is the chief sucking organ in the female *Culex*, and which I have found in no other dipteron, is supported by three longitudinal chitinous rods, which are stouter continuations of the three rods supporting the oesophagus through the nerve-ring. These rods (fig. 10, *r*) have between them chitin-plates (fig. 10, *t*) which are suspended from the rods by elastic membranes. On the dorsal plate is inserted a double muscle, or a pair of muscles (*bm*), the origin of which is in the dorsal part of the chitinous shell of the head. Each of the lateral plates has inserted on it a muscle (*bm′*), the origin of which is in the chitin of the lower lateral regions of the head. The origin of each of these muscles is in the so-called occipital region of the head, that is, behind the eyes. By the simultaneous contraction of these muscles (*bm* and *bm′*), the lumen of the oesophageal bulb is enlarged, and the blood flows into the bulb from the pharynx, and, upon their relaxation, the elasticity of the chitinous walls of the bulb drives the blood, which cannot return to the pharynx because of the closing of the valve at *v* (fig. 11), into the stomach.

IN THE MALE.

The mouth-parts of the male of *Culex* have not been described, as far as I know, with any degree of accuracy although, since Swammerdamm's time, the males have been distinguished from the females, by all scientific entomological writers on the subject, by means of their feather-like antennae and maxillary palpi.

The proboscis of the male of *Culex pipiens*, the only species the male of which I have studied, is slightly longer and slenderer than the corresponding organ in the female. The setae are fewer in number and less completely sheathed by the labium than in the female; they consist of a well-developed labrum-epipharynx and two slightly developed maxillae. The mandibles are absent, and the hypopharynx coalesces with the labium (fig. 12, *h* and *l*). The labium and maxillary palpi are more densely covered with hair and scales than they are in the females, and they contain muscles; the other mouth-parts, the setae proper, are naked, chitinous, and contain no muscles. In comparative length the mouth-parts may be arranged, longest first: maxillary palpi, labium and labrum-epipharynx, maxillae; — in comparative size they may be arranged, largest first: labium, maxillary palpi, labrum-epipharynx, maxillae. The relative position of the mouth-parts of the male is different from that in the female (compare fig. 8–9 with 13–15) in that the short, rudimentary maxillae are pushed out sidewise to allow the hypopharynx to coalesce with the labium. In the male the oesophageal pump, or bulb behind the nerve-ring, fails, and the sucking of fluids must be done by the pharynx alone, as it is done in most diptera.

The labrum-epipharynx is nearly the same in general form and structure in the male *Culex* as it is in the female, it is a trifle longer and slenderer, but the same figures (5 *lr-e*, and 6) will serve for the tips of both. In section (fig. 12, *lr-e*), the labrum shows a groove on its upper surface, which deepens as it nears the base (fig. 13, *lr-e*). The apical four-fifths of the labium contains no other seta than the labrum-epipharynx, as seen in fig. 12, which is a section at about the middle of the proboscis. At the base of the labrum-epipharynx are pharyngeal muscles similar to those found in the female, and with similar insertions and origins, except that the median muscle (fig. 15 *pm'*) is not divided into three parts as in the female (fig. 9, *pm'*).

The hypopharynx is, throughout its whole length, joined to the labium, and thus necessarily pushes the maxillae, which would normally lie between it and the labium, to one side. (See fig. 13, *h* and *mx.*) The hypopharynx shows, in section (fig. 13–15 *h*), the same chitinous rod through the middle as in the females, but I was unable to detect any channel for saliva through this rod.

The maxillae are very thin lamellae of transparent chitin, about one-fifth as long as the labium, and so delicate as to be easily overlooked. Although as broad at the base as is the tube of the epipharynx, they taper regularly from their base to their fine tips.

The maxillary palpi are five-jointed, very hairy toward the tip, much longer than they are in the female, and when at rest their basal portions cover the labrum-epipharynx and maxillae in the sheath of the labium.

The labium of the male *Culex* is similar in general structure to that of the female, if one considers it together with the hypopharynx. It is, however, slenderer, more densely covered with scales, has a shallower groove for the reception of the labrum-epipharynx, and has a joint near the middle. The slenderness of the labium in the male extends itself to the labellae. (Compare fig. 4, *lb* with fig. 3, *lb.*) The groove of the labium of the male increases in shallowness from tip to base; at the middle of the proboscis (fig. 12) it is so shallow that it fails to fully protect the labrum-epipharynx, and at its base (fig. 13) it is so shallow that the other mouth-parts rest only on top of the labium. To make up for this deficiency of protection by the labium, the maxillary palpi, as was previously mentioned, cover over the upper side of the enclosed parts (see fig. 13), and thus, although free from the labium, form a part of the protective sheath, which, in the female, is formed by the labium alone. Whether the joint near the middle of the labium of the male *Culex* is true or false I cannot say, since I have never seen it bent by the insect itself; its appearance is that of a true joint. Like the labium of the female, that of the male has two longitudinal main tracheal stems (figs. 12–14, *tr*), and two rows of longitudinal muscles.

EXPLANATION OF PLATE I.

The following letters always have the same signification:

c,	clypeus.	*m*,	mandibles.
e,	epipharynx.	*mp*,	maxillary palpi.
h,	hypopharynx.	*mx*,	maxillae.
i,	infraoesophageal ganglion.	*oe*,	oesophagus.
l,	labium.	*p*,	pharynx.
lb,	labellae.	*pm*, *pm'*,	pharyngeal muscles.
lr,	labrum.	*s*,	supraoesophageal ganglion.
lr-e,	labrum-epipharynx.	*tr*,	tracheal stem.

The number of diameters enlargement is indicated against each figure.

Shaded parts of sections are portions filled with connective tissue, nerves, air-spaces, and other parts, which have no significance in connection with points discussed in this paper.

Fig. 1. Side view of head of *Culex rufus*, with extended mouth-parts; *a*, antennae.

Fig. 2. Same from above with mouth-parts partly cut away.

Fig. 3. Tip of labium of female *Culex*.

Fig. 4. Same of male *Culex*.

Fig. 5. Tips of separated setae of mouth-parts of *Culex*.

Fig. 6. Tip of labrum-epipharynx of *Culex*, seen from beneath and in section.

Fig. 7. Cross-section through the labellae and tip of labium of female *Culex*.

Fig. 8. Cross-section near the middle of the proboscis of female *Culex*.

Fig. 9. Cross-section through pharyngeal region of the forward part of the head of female *Culex*.

Fig. 10. Cross-section through the posterior part of the head of female *Culex*, to show the sucking bulb of the oesophagus. *b*, lumen of the oesophageal bulb. *bm*, *bm'*, muscles to dilate the bulb. *r*, chitinous rods which support the oesophageal bulb. *rm*, retractor muscles of the maxillae, at the point of origin of their muscles. *t*, elastic plates of sides of bulb.

Fig. 11. Longitudinal section of the head of female *Culex*. *b*, oesophageal bulb. *g*, point where the clypeus appears nearly cut off from the rest of the head. *v*, valve between pharynx and oesophagus.

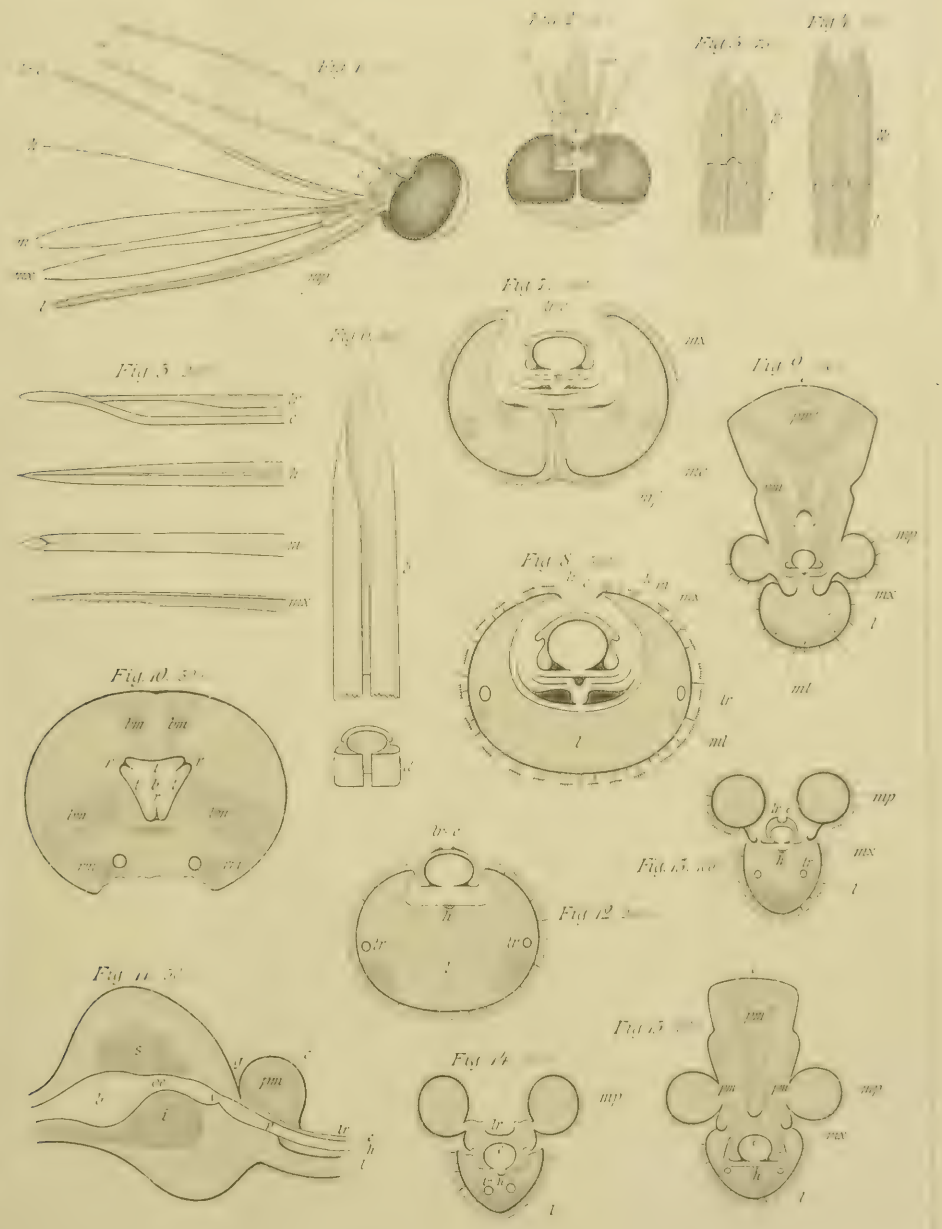
Fig. 12. Cross-section near the middle of the proboscis of male *Culex*.

Fig. 13. Cross-section at the base of the proboscis of male *Culex*.

Fig. 14. Cross-section further into the base of the proboscis of male *Culex*.

Fig. 15. Cross-section through the pharyngeal region of the head of male *Culex*.

Plate I.



G. Dimmock del.

Lith. Anst. v. Werner & Winter, Frankfurt a/M.

Whether the male *Culex* can bite, or not, is a question to which I can give no decisive answer; but I do not believe it can. I have often taken male mosquitoes, with all possible care to prevent disturbing them, beneath a glass cover upon my hand, letting them remain long enough to be as tranquil as they were when upon the leaves and grass of the field, but they would neither bite nor show any desire to do so, nor have I been able to feed male mosquitoes with water, saliva or fresh blood, all of which liquids the females often drink with avidity.

Upon anatomical grounds I believe that male mosquitoes take liquid food, although I have never dissected their stomachs to see what this food was. They have mouth-parts and pharynx developed sufficiently to suck liquids; but the absence of barbed maxillae, of a free hypopharynx, and of an oesophageal bulb, leads one to suppose that they take a smaller quantity of food than the females do, and that they do not obtain it by piercing the skins of animals.

THYRIDOPTERYX EPHEMERAEFORMIS HAWORTH. ITS HABITS AND METAMORPHOSIS.

BY HELEN SELINA KING, SAN ANTONIO, TEXAS.

This insect, whose range embraces Europe and Australia, is also found in certain parts of the United States.

Near Dallas, Texas, hundreds of cedar trees may be seen stript of all foliage and killed by this insect, with their branches laden with its cases. Near Austin, Texas, its favorite food is a species of wild bramble, *Smilax rotundifolia* Young, but many other trees and shrubs furnish ready substitutes. Among these are the scrub-oak, the peach pomegranate, the Judas tree (*Cercis*), and even weeds of certain kinds, while the variety of cedar found there does not seem to be molested.

The habits of this insect have already received the careful attention of entomologists and my object is to fill, as far as I can, any blanks which may have occurred in previous observations, by giving such items as have rewarded my personal attention to its habits and metamorphoses.

The perfect insect is bisexual but is supposed to be occasionally parthenogenetic. I have not yet demonstrated this latter trait.

The male has short, sub-hyaline wings, sparsely scaled, of a dull brown color, and quickly expanding as in hesperians, which it also resembles in its broad head and large eyes. The antennae are deeply pectinate on their basal half, with minute pectinations on the terminal portion. The abdomen, usually short, showing the tip of the terminal segment is retractile and capable of great extension.

The female is apterous, apodous, and almost acephalous, the small head, bent slightly forward, being scarcely distinguishable as such but for its relation to the other members, and its two minute ocelli. There are no antennae, and no visible organs of manducation. This small head and the gradually enlarging thoracic segments are acutely carinated on the median dorsal line, and are enclosed in a chitinous membrane of a burnt-straw-color. There are not even rudimentary feet, but rather indications of what would be their normal position.

On the anterior part of the sternum is a dark movable body, plainly seen beneath the skin, corresponding in its appearance and motions to the heart of the earth-worm, *Lumbricus terrestris*. The posterior end of this body is pointed, the anterior rounded. When the insect is at rest, this body is comparatively stationary.

From the thorax the body becomes of a paler color, cylindrical, rounded at posterior end, and much larger than thoracic segments. The abdomen seems filled with eggs and fat, visible through the thin membrane.

The female perfects her last transformation from about the middle of March to the middle of May. When first matured from the pupa stage she seems to have been covered with short hair of a soft silky texture and straw-color. This, rubbing off easily with her motions, falls like down around her, that on the anterior part of the body first. As soon as the female is perfected she projects her head from the lower end of the case and begins to deposit her eggs. These are cylindrico-oval, smooth, white, and glistening, and about twenty in number. They are imbedded in the soft hairs from the mother's body, and remain thus for weeks before hatching.

When the female has ceased depositing her eggs her body is an empty, lifeless shell.

It is probable that the life-cycle embraces a period of two years, as the larvae may be found at all seasons, and in various stages of growth, well protected from the heat of summer and cold of winter by their weather-proof cases.

The eggs mature, according to the season, in three, six, or eight weeks and the young larvae are found as early as the latter part of June. Having eaten their shells they at once proceed to house-building, usually finding suitable materials near at hand, as the female imago lives and dies in her case, which is swung to a twig or vine of her proper food-plant; but if by chance this is inaccessible, many other forms of vegetation will serve their temporary needs, such as rose-leaves, or the *Canna*. When first noticeable, the larva is about 2 mm. long. It cuts out circular pieces from the leaf, about the size of a small tack-head; this it spins together with a little silk into a small cone, which it carries with the apex in the air, the posterior end of its anal segment adhering to the inner surface of the cone. It moves about from one part of the leaf to another, and, unlike the more fully grown individuals, when falling, suspends itself by a silk thread. It will even leave its case and afterwards return to it. When not feeding it spins its upright tent to the leaf.

When fully grown and presenting its more permanent features, it is about 40 mm. long with a case much longer. Its head and three anterior segments are brownish, polished, and with ivory vittae and spots. These segments overlap anteriorly, and the elastic membrane between is of a dirty lavender color. The abdominal rings nearest these, which are sometimes visible, are of a dull brown, and with no distinctive features. The silk tubes are quite conspicuous; mouth-parts dark.

The anterior segments are longer than the others, and the large, strong, clawed feet seem to spring from the middle line of the venter, making a semicircle terminated by the claws. When the larva is resting in the day these claws are all bunched up, at the mouth of the case, or withdrawn within it, only one remaining attached to the branch from which it is thus momentarily suspended.

At night the larva spins a number of threads from the case around the branch, and retires within its recesses. Ordinarily the mouth of the case, large and loose, falls together when not expanded by the larva's body. For the pupal change, it spins up the mouth and fixes it firmly to some stationary object, usually its food-plant.

If the case of one of these larvae be cut open, and an empty one be cut and applied to it, the larva, although preparing to enter the pupa stage, will rouse itself and unite these into one. The larvae also use for the construction of these cases various kinds of leaves, twigs, and vines. These are put on, one over the other, like shingles on a house, and frequently so near together that they stand out straight and look ruffled.

A larva having been removed from its case and put in a pill-box, with some raw cotton and its proper food, soon constructed for itself a new case from the cotton, lined it with silk, made a mouth for it, and then, crawling to a branch placed near, suspended itself as usual.

In order to remove it from its natural case I had only to touch this on one end, and the larva would continue retreating until it emerged at the opposite extremity. After many interesting exploits this larva disappeared.

HABITS OF *HYPOPREPIA PACKARDII*, GROTE.

BY MARY ESTHER MURTFELDT, KIRKWOOD, MO.

In 1879 I had the pleasure of tracing the larval history of the pretty little Lithosian above named, the imago of which was described some years ago by Mr. A. R. Grote in the Proceedings of the Entomological Society of Philadelphia, April, 1863, v. 2, p. 31.

Upon my writing to Mr. Grote regarding its immature stages, he informed me that nothing had been published on the subject, and that he himself had never observed the transformations. As I have seen nothing since that date referring to this species, I trust that the following notes may not be altogether without interest to those making a specialty of the group to which it belongs.

Two larvae were found in dormant state, 20 Dec., under loose bark of black oak (*Quercus tinctoria* Bart.). They were then about 6 mm. in length, hairy, and of a mottled light and dark gray color, the head being similarly clothed and colored. They bore a strong general resemblance to the young larvae of some species of *Callimorpha*.

Fearing that they might succumb to the somewhat unnatural conditions of the rearing cage, I attached them, for hibernation, to a branch of the tree, under a thick muslin cover. They were not again examined until the middle of the following March, when, as the season was early, they were found to have awakened from their torpor and to be crawling about over the bits of bark upon which they had wintered. For more convenient observation they were again placed in the insect cage and liberally supplied with the most advanced buds. They did not, however, seem to feed upon the latter, and continued to crawl about restlessly over the bits of dry bark, which they covered with a great deal of fine cob-webby matter. On the 1st of April both molted and shortly after this I discovered that they fed upon the outer surface of the bark itself, or upon the lichens that covered it. Fresh bark was provided upon which they began gnawing with avidity and from this time growth was quite rapid. A second molt occurred 15 April and a third 1 May. At this date they measured 8.3 mm. in length by 2.5 mm. in diameter. The form was somewhat flattened and the width nearly the same throughout. Color pale cinereous, variegated with fine curved lines and dots of purple-brown; medio-dorsal stripe pale, margined on each side with a distinct purple line, not continuous, but composed of very minute dashes and dots. Venter translucent, dingy buff. Head and legs colored similarly to the dorsum, all sparsely clothed with long, fine, light hairs springing directly from the surface.

On 7 May both larvae were enclosed under a veil-like smoke-colored web, closely appressed to the under side of the bark. They had shrunken somewhat and the thoracic segments appeared slightly flattened and bulging laterally, giving the insects the appearance of minute catocalid larvae. By 10 May both had completed their first transformation. Pupae, 6.2 mm. in length, oblong, depressed and of a glossy dark brown color. The imagines appeared on 27 and 28 May and proved to be of different sexes.

As Mr. Grote's description of the perfect insect is brief I take the liberty of appending it: —

Imago: "Anterior wings entire, silky, dark steel grey with a yellowish well defined spot on the costa near the apex. A band of same color on the internal margin, well defined and commencing near the internal angle and continuing to the base of the wing, showing a spot of the same shade as the ground color. Posterior wings rose color with a wide greyish border not extending quite to the anal angle. Under side of the wings showing the markings of the upper. Head rose color. Antennae darkish. Thorax yellowish. Abdomen rose color. Expands eleven sixteenths of an inch [17.5 mm]." In the male the yellow bands and spots on the anterior wings are broader than on the female, and the abdomen of the former terminates in a dense rose colored tuft.

PSYCHE.

CAMBRIDGE, MASS., JULY-SEPT. 1881.

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PROCEEDINGS OF SOCIETIES.

CAMBRIDGE ENTOMOLOGICAL CLUB.

14 JAN. 1881. — 73rd meeting. This being the seventh annual and the fourth annual corporate meeting, an election of officers for the year was held, with the following result: *President*, E: Laurens Mark; *Secretary and Treasurer*, B: Pickman Mann; *Librarian*, Clifford Chase Eaton; *Executive Committee*, The President, Secretary and Treasurer, *ex officiis*, and S: Hubbard Scudder, E: Payson Austin and E: Burgess; *Editor of Psyche*, B: Pickman Mann.

Mr. W: Trelease, Prof. Selim Hobart Peabody, and Mr. J: Sterling Kingsley were elected members.

The retiring president, E: Burgess, made, in place of an annual address, some remarks upon the internal structure of the head of the cockroach and grasshopper, illustrated by original drawings, which he had prepared for the second report of the United States Entomological commission.

The death of Mr. Edwin C: Prentiss, the compositor upon the third volume of PSYCHE, who had so faithfully carried on his business connection with the publication, was announced. [See PSYCHE, Oct. 1880 (12 Feb. 1881), v. 3, p. 128.]

11 FEB. 1881.—74th meeting. The fourth annual report of the Secretary and Treasurer, dated as of the January meeting, was read.

Five members have been elected during the past year. The present number of resident members is sixteen and that of non-resident members fifty-nine, an increase of three. Of 107 persons elected members, 5 have died and 27 have retired from various other causes. Thirteen principal communications have been presented by five members. The second volume of PSYCHE, except the indices, has been completed and distributed. The deficit upon the account of the first volume of PSYCHE is now $76.64, and that upon the second volume $126.16, with considerable expenses still to be incurred, leaving out of account the cash advanced toward defraying the expenses of the second volume by one of the members of the Club.

Owing to the arrangement made for the publication of the third volume, the deficit does not appear upon the Treasurer's books.

The permanent publication fund amounts to $173.05.

The report of the Librarian shows the library to be in good condition, containing 799 publications exclusive of separate volume numbers. The principal source of accession has been as usual, by gift from individuals and societies, the Club having no funds with which to buy books. A card catalog of the works in the library is nearly completed.

(*To be continued.*)

GOSSE'S OBSERVATIONS ON THE BUTTERFLIES OF NORTH AMERICA.

GOSSE, whose popular writings on English natural history are well known, spent several years in Canada, a year in Alabama, and some time in Jamaica. He has recorded his out-door observations in these places in three distinct books, all of them now very rare, and to many scarcely known. That upon Jamaica covered the birds only; the others were of a more miscellaneous character and were entitled "The Canadian naturalist; a series of conversations on the natural history of Lower Canada" (London, 1840. 12 + 372 p., 12°); and "Letters from Alabama, U. S., chiefly relating to natural history" (London, 1859. 12 + 306 p., 16°). His residence in Canada was fixed at Sherbrooke, a short distance north of the Vermont line, where he seems to have lived two or three years, about 1837. In Alabama, to which he went from Canada, he lived as a teacher on a plantation at Pleasant Hill, a little south of Selma, near the centre of the state; and his letters from here were written to a journal called the *Home friend*, and afterwards collected in the volume mentioned. A large portion of both books is devoted to entomology, and they are full of original observations. The list given below may be considered an index to his notes upon the butterflies, showing the species discussed, with references to pages and wood-cuts, and a brief memorandum of the scope of his observations. The names are those employed by him (with his peculiarities of spelling), and when the species intended is not at once clear to one familiar with the synonymy of our butterflies, the correct name is added in brackets. The references following the letter **C** are to the Canadian naturalist, those following **A** to the Letters from Alabama.

Hipparchia andromacha. **C**, 246. Fig. upper surface of imago; habits.—**A**, 122. Gamesome habits.—272. Taken 25 Aug.

Hipparchia alope. **A**, 55. Fig. under surface of imago. — 203. Descr. imago; habits.

Hipparchia transmontana [*Satyrodes eurydice*]. **C**, 247. Appeared about 15 July; description; flight.

Hipparchia gemma. **A**, 121. Appeared about 12 June.

Hipparchia areolata. **A**, 121. Appeared about 12 June.

Hipparchia sosybius. **A**, 55. Fig. under surface of imago; habits; descr. imago. — 272. Seen 25 Aug.

Hipparchia eurythris. **A**, 55. Fig. upper surface of imago; habits; descr. imago.

Hipparchia sp. [*alope* ♂ ?]. **A**, 203. Descr. imago; habits.

Danais archippus. **C**, 262. Fig. under surface of imago; distribution; flight.—**A**, 78. Description.—185. Description of larva and pupa.—185-188. Metamorphoses of butterflies in general; chrysalis 8 days.

Limenitis arthemis. **C**, 220. Figs. larva, pupa and under surface of imago.—221. Description of larva on elm; changes. — 226. Butterfly from pupa about 1 July; description. —228. Seasons.—248. Sixteen seen together 5 July; growing scarce 15 July. — 306. Seen 4 Sept.

Limenitis ursula. **A**, 123. Description; its resemblance to *arthemis*.—272. Seen 25 Aug.

Grapta c-aureum [*Polygonia interrogationis*]. **C**, 280. Larva on hop; pupa 11 days. — 295. Pupa on grass.—323. Numerous 16 Oct., one that day from pupa.—334. Seen about 16 Oct.—**A**, 59. Seen 1 June.—272 (*interrogationis*). Seen 25 Aug.

Grapta c-album? [*Polygonia comma*]. **C**, 174. Taken about 22 May.—221. Larva on nettle.—226. Larva changed to pupa 1 July. —246. Butterfly appeared about 15 July, after 7 days in pupa.

Grapta progne? [*Polygonia faunus?*]. **C**, 96. Taken 15 April.—97. Brief description. —278. Reappeared about 16 Aug.

Grapta c-argenteum. **C**, 249. Larva on wild gooseberry; descr. of larva and pupa.—261. Pupa state 13 days.

Grapta sp. **C**, 84. Some species seen 12 April.—97. Five species distinguished.—305. Different species numerous 20 Sept.

Vanessa j-album. **C**, 96. Seen about 27 April.—97. Resemblance to English "tortoise shells." — 247. Reappearance about 15 July; seasons.—323. Seen 16 Oct.

Vanessa furcillata. **C**, 107. Common; found in Newfoundland; larva on nettle.—221. Larva on nettle.—226. Larva changed about 1 July.—248. A curious variety.

Vanessa antiopa. **C**, 96. Seen about 27 April.—97. Abundance. — 261. Reappeared about 30 July.—294. Larva changing 1 Sept. —305. Numerous 20 Sept.—323. Seen 16 Oct.—334. Numerous about 16 Oct. — 356. Pupa found 25 Dec. on wall of house.

Vanessa atalanta. **A**, 202. A great rarity here; found in Canada and Newfoundland.

Cynthia huntera. **A**, 78. Comparison with *C. cardui*.—148. Becoming common 1 July. —272. Taken 25 Aug.

Argynnis vanillae. **A**, 203. Appeared 12 July; description.—272. Taken 25 Aug.

Argynnis columbina. **A**, 148. Description; rare.—272. Taken 25 Aug.

Argynnis cybele. **C**, 261. Distinguished from *A. aphrodite.*

Argynnis aphrodite? **C**, 228. Common 1 July; description.

Melitaea myrina. **C**, 192. Appeared about 10 June; description; definition of "fritillaries"; seasons; habits. — 290. Abundant on thistles, 1 Sept.

Melitaea phaeton. **C**, 227. Figs. butterfly; taken about 30 June; description.

Melitaea tharos. **C**, 219. Appeared about 20 June; description. — **A**, 59. Common.—272. Taken 25 Aug.

Libythea motya. **A**, 204. Description.

Thecla mopsus. **A**, 148. Description; common.

Thecla hyperici. **A**, 213 note. Probably identical with *Th. favonius.*

Thecla poeas. **A**, 52. Fig. upper surface of butterfly.—171. Description; habits; first seen 3 July.

Thecla falacer. **A**, 37. Habits and flight.

Polyommatus lucia. **C**, 123. Seen 10 May; flight and habits.—150. Female taken 20 May.—247. Does not hibernate.

Polyommatus pseudargiolus. **A**, 144. Description; pugnacious habits.

Thecla comyntas. **A**, 272. Taken 25 Aug.

Lycaena phlaeas. **C**, 219. Its beauty; appeared about 20 June.—221. Variety taken in September; eggs.

Colias eubule. **A**, 38. Flew to flower in hand.— 212. Still plentiful on 1 Aug. — 272. Taken 25 Aug.

Colias coesonia. **A**, 53. Description.

Colias philodice. **C**, 184. Appeared from 25 May to 1 June; seasons; description of white variety. — 223. Congregates. — 247. Butterfly does not hibernate.—262. Congregates.—323. Numerous 16 Oct.

Colias diara [*Nathalis iole?*]. **A**, 53. Description.

Xanthidia delia. **A**, 213. Recently appeared 1 Aug. — 272. (*Colias.*) Taken 25 Aug.

Xanthidia tucunda. **A**, 212. Common in May and June, not yet disappeared 1 Aug.; description; distinction from *X. delia;* Boisduval's error about it.

Colias nicippe. **A**, 53. Found in gardens. —272. Taken 25 Aug.

Pontia oleracea. **C**, 123. Seen 10 May.—247. Butterfly does not hibernate.

Papilio philenor. **A**, 77. Description; habits.—148. Becoming scarce 1 July. —272. Taken 25 Aug.

Papilio troilus. **A**, 78. Description; rare.—148. Becoming common 1 July.—272. Taken 25 Aug.

Papilio turnus. **C**, 183. Fig. under surface of butterfly; appeared 25 May–1 June; habits; distribution. — 194. Abundant 10 June; habits.—195. Reared; imprisoned ♀ does not attract ♂.—223. Congregates.—261. Disappeared about 15 July.—293. Habits of caterpillar; food plants.—**A**, 122 (*glaucus*). Description; habits.—202 (*turnus*). Noticed.

Papilio calchas. **A**, 169. Description; becoming common 3 July.—272. Taken 25 Aug.

Papilio thoas. **A**, 170. Description; habits.

Papilio ajax. **A**, 51-53. Figs. larva, pupa and under surface of imago; description.—148. Nearly all gone 1 July.

Papilio asterius. **C**, 184. Found in Newfoundland and southern states; not met with in Canada. **A**, 78. Numerous; description.

Eudamus tityrus. **A**. 61. Flight.—85-87. Caterpillar; nest; cocoon; pupa 13 days; habits of butterfly.—272. Taken 25 Aug.

Eudamus bathylius. **A**, 272. Taken 25 Aug.

Thymele brizo. **C**, 184. Appeared 25 May–1 June; not common; flight.

Hesperia catullus. **A**, 204. Description.

Hesperia orcus? [*Hesperia tessellata*]. **A**, 272. Taken 25 Aug.

Pamphila paniscus? [*Heteropterus mandan*]. **C**, 219. One taken about 20 June.

Hesperia phylaeus. **A**, 204. Description.

Pamphila peckius. **C**, 193 (*Hesperia*). Appeared about 10 June; characteristics of skippers. — 228 (*Pamphila*). Abundant 1 July.

Pamphila otho? **A**, 272. Taken 25 Aug.

Pamphila cernes. **C**, 228. Abundant 1 July.

Pamphila sp. **A**, 272. Taken 25 Aug.

Samuel H. Scudder.

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [ ], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

Corrections of errors and notices of omissions are solicited.

[**Allen**, Grant.] The origin of flowers [by G. A.]. (Cornhill magazine, May 1878, v. 37, p. 534–550.)

Considers the color sense in animals, in its bearings upon the evolution of colored flowers, etc. *W: T.* (2338)

Arcangeli, G. L'*amorphophallus titanum* Beccari. (Nuovo giorn. bot. ital., 7 July 1879, v. 11, p. 217–223.)

Shows that insects are attracted to the spathe, and discusses the pollination of the flowers. *W: T.* (2339)

Austin, *Mrs.* R. M. Leaves of *darlingtonia californica* and their two secretions. (Bot. gazette, Nov. 1878, v. 3, p. 91, 9 cm.)

Describes the nectar and digestive fluid secreted by the Californian pitcher plant, and notes that insects are found in the leaves. *W: T.* (2340)

Axell, Severin. Om anordningarna för de fanerogama växternas befruktning. Stockholm, 1869. 116 p., 24×16, t 16.5×10.5; 58 fig.

Discusses the modes of pollination in flowering plants, describing the adaptation of many to crossing by aid of insects. *W: T.* (2341)

Bailey, W: Whitman. Cross fertilization of *baptisia tinctoria*. (Bot. gazette, Aug.–Sept. 1880, v. 5, p. 94, 2 cm.)

Humble bees [*bombus*] effect crossing of distinct flowers. *W: T.* (2342)

Banning, Mary E. Maryland fungi. (Botanical gazette, Apr. 1881, v. 6, p. 201.)

Remarks (8 cm.) on the dissemination of the spores of phalloids by insects which are attracted by the loathsome odor of these fungi. *W: T.* (2343)

Barber, *Mrs.* M. E. On the structure and fertilization of *liparis bowkeri*. (Journ. Linn. soc., Bot., 6 Feb. 1868, v. 10, p. 455–458.)

Describes the adaptation of the flowers of this orchid to cross-fertilization by hymenoptera and diptera, and figures a hypothetical insect in one flower; but does not mention having seen insects at work. *W: T.* (2344)

Barnes, C. R. The anthers of *clethra*. (Bot. gazette, Aug.–Sept. 1880, v. 5, p. 104–105.)

Cross-pollination in *clethra alnifolia* and *c. acuminata* "is effected almost altogether by honey bees" [*apis mellifica*], which visit the flowers for nectar secreted by epipetalous glands. *W: T.* (2345)

Batalin, A. Beobachtungen über die Bestäubung einiger Pflanzen. (Bot. Zeitung, 28 Jan. 1870, v. 28, p. 53–55.)

Describes the floral structure of *sagina*, *mimulus* and *syringa*. Notes insects which visit the second. *W: T.* (2346)

Beal, W: James. Carnivorous plants. (Proc. Amer. assoc. advanc. sci., 1875, v. 24, p. 251–253.)

Describes the insect-catching of several genera of insectivorous plants. Records the capture of insects by viscid hairs of others, and by the sticky bud-scales of still other species. *W: T.* (2347)

Behrens, W. Die Bestäubungsmechanismus bei den Gattung *coboea*. (Flora, 11 Sept. 1880, v. 63, p. 403–410.)

Shows the adaptation of *coboea scandens* to fertilization by humble bees [*bombus*] and contrasts it with the sphingophilous *coboea penduliflora*. *W: T.* (2348)

Belt, T: Bees and clover. (Nature, 11 Nov. 1875, v. 13, p. 26, 14 cm.)

Apropos of the sending of English humble-bees [*bombus*] to New Zealand to induce fruiting of clover [*trifolium*], the writer shows that *bombus terrestris* invariably pierces the clover flowers for their nectar, and is thus injurious instead of beneficial. The habits of this species when visiting other flowers are noted. It is suggested that bees could best be shipped in winter, during the hibernation of the fertilized queens. *W: T.* (2349)

Belt, T: The importation of humble bees into New Zealand. (Science gossip, 1878, p. 89-90, 18 cm.)

Discusses the behavior of several English species of *bombus* when visiting flowers of *trifolium pratense* and believes that if bees are to be imported for the sake of securing clover-seed, the proper species is *b. lapidarius*, which "although it has the longest proboscis, has also the shortest temper and most virulent venom." *W: T.* (2350)

Bennett, Alfred W. Fertilization of the pansy. (Nature, 19 June 1873, v. 8, p. 143, 5 cm.)

Records observations on *viola calcarata*, *v. elatior* and *v. lactea* which he believes to be fertilized by bees; and on *v. tricolor* which he believes to be fertilized by *thrips*. *W: T.* (2351)

Bennett, Alfred W. The fertilization of the wild pansy. (Nature, 15 May 1873, v. 8, p. 49–50.)

Describes the structure of the flowers of *viola tricolor* var. *arvensis*, which he believes adapted to fertilization by *thrips*. Notes the presence of these insects in the flowers. *W: T.* (2352)

Bennett, Alfred W. Fertilization of *ruscus aculeatus*. (Journ. of botany, Jan. 1870, v. 8, p. 9-10, 11 cm.)

Inquires as to the mode of fertilization. Believes that the time of flowering, in midwinter, is against its fertilization by insects, and cannot see how it can be anemophilous. Criticizes a statement of M'Nab, as to the disposition and time of appearance of the flowers. *W: T.* (2353)

Bennett, Alfred W. Further observations on protandry and protogyny. (Journ. of botany, 1871, v. 9, p. 329-330.)

Notes that some of the species noted in his "Observations in protandry and protogyny" . . . [Rec., 2356] as synacmic are protandrous, while a few noted before as protandrous are synacmic. Describes adaptation to cross-fertilization in one or two species, and adds to the list of plants observed with respect to protandry or protogyny. *W: T.* (2354)

Bennett, Alfred W. Note on the structure and affinities of *parnassia palustris*, L. (Journ. Linn. soc., Bot., 19 Nov. 1868, v. 11 [1871], p. 24-31.)

Includes a description of the flower and of its fertilization by insects, chiefly "a long-legged dipterous fellow." *W: T.* (2355)

Bennett, Alfred W. Observations in protandry and protogyny in British plants. (Journ. of botany, Oct. 1870, v. 8, p. 315-321.)

Abstract. (Rept. Brit. assoc. advanc. sci., 1870, p. 111, 4 cm.)

Describes the dichogamy of a number of plants, as a means of securing their cross-fertilization by insect agency. The abstract falsifies the text. *W: T.* (2356)

Bennett, Alfred W. Remarkable plants, 2. Some curious orchids. (Nature, 22 Feb. 1877, v. 15, p. 357-359.)

A review of C: Darwin's "The various contrivances by which orchids are fertilized by insects. 2d ed." [Rec., 2379]. Treats of the general structure of the orchid flower, and the pollination of *coryanthes macrantha*, *catasetum saccatum*, and *mormodes ignea* by aid of insects. *W: T.* (2357)

Berkeley, Miles J. Egg fungi. (Intellectual observer, July 1866, v. 9, no. 54, p. 401–406.)

States (p. 402) that the sporiferous mass of the stinkhorn (*phallus impudicus*) is a favorite food of flies. *W: T.* (2358)

Bessey, C: Edwin. Sensitive stamens in *portulaca*. (Amer. nat., Aug. 1873, v. 7, p. 464–465.)

Shows how the irritability of the stamens in *portulaca grandiflora* and *p. oleracea* aids in cross fertilization. Records the visit of "a small wild bee" to the former. *W: T.* (2359)

Bonnier, Gaston. Les fleurs et les insectes. (Revue scientifique, 2 Apr. 1881, ser. 3, v. 27, p. 419–425.)

A popular lecture delivered before the "Association scientifique de France," in which the author discusses the origin and uses of floral and extrafloral nectar, and concludes that it is merely water transpired through tissues charged with sugar, and is in nowise an adaptation for securing the pollination of the flowers or the protection of the plant. *W: T.* (2360)

Breitenbach, W: Die Blütheneinrichtung von *arum ternatum* Thnbg. (Bot. Zeitung, 24 Oct. 1879, v. 37, c. 687-692.)

Crit. rev., by H. Müller, entitled "Berichtung der von W. Breitenbach gegebenen Erklärung der Bestäubungsvorrichtung von *arum ternatum*." (Bot. Zeitung, 19 Dec. 1879, v. 37, c. 838-839, 35 cm.) [Rec., 2450.]

Describes the floral arrangement for securing, as he believes, close fertilization by insect agency. *W: T.* (2361)

British association for the advancement of science — [*46th meeting*] — *Glasgow meeting, 1876—Section of biology.* President's address. (Rept. British assoc. advanc. sci., 1876, p. 100-119.) (Nature, 7 Sep. 1876, v. 14, p. 403-412.) (WALLACE, A. R. Tropical nature, chap. 7, p. 249-303.)

Rev., by H. Müller, entitled "Ueber die besonderen Beziehungen zwischen Pflanzen und Insecten, welche sich auf Inseln darbieten." (Bot. Jahresbericht . . . Just, 1876, v. 4, p. 941–942.)

Address, by Alfred Russel Wallace, on by-paths in the domain of biology. Discusses, among other things, the peculiar relations of plants and insects as exhibited on islands; correlating the peculiarities of island floras with the character of the insect faunas of the same. *W: T.* (2362)

Brittain, T: Another insectivorous plant. (Science gossip, Mar. 1877, p. 18.)

States that the flowers of *apocynum androsaemifolium* capture flies: and evidently is not aware that the plant is not insectivorous, and that the capture of small insects in its flowers has been known for several generations. *W: T.* (2363)

Canby, W: M. *Darlingtonia californica*, an insectivorous plant. (Proc. Amer. assoc. advanc. sci., 1874, v. 23, pt. 2, p. 64-72.)

Shows the adaptation in the leaves of the Californian pitcher plant for the capture of flying insects, and records the observations of J. G. Lemmon on the insects captured. *W: T.* (2364)

Caruel, T. Illustrazione di una *rubiacea* del genere *myrmecodia*. (Nuovo giorn. bot. ital., July 1872, v. 4, p. 170-176.)

The seedlings of this epiphyte die unless the stem is pierced by a particular species of ant, but in case this happens, the stem enlarges to form a gall-like excrescence, in which the ants excavate galleries, and establish themselves, while the plant goes on to complete development. Similar relations with ants are indicated for species of *hydnophytum* and *clerodendron*. *W: T.* (2365)

Comes, Orazio. Studii sulla impollinazione in alcune piante con tavola litografata. Memoria per laurea premiata dalla Facoltà di scienzi naturali della R. università di Napoli. Napoli, 1874. t.-p. cover, 25 p., 23 ×16, t 16×10.

Describes the floral structure of about 20 species of plants, and notes the insects seen to visit their flowers. Notes the perforation of the corolla of *salvia* and *tropaeolum* by *xylocopa* and *apis*. *W: T.* (2366)

Crüger, H. A few notes on the fecundation of orchids, and their morphology. (Journ. Linn. soc., Bot., 3 Mar. 1864, v. 8, p. 127-135, pl. 9.)

Describes the adaptations for fertilization in *catasetum*, *coryanthes* and *stanhopea*, which are visited by bees (*bombus* and *euglossa?*) for the purpose of gnawing their labella. Cockroaches [*blatta*] are also said to be fond of the same part of the flowers. *W: T.* (2367)

Darwin, Francis. Bees visiting flowers. (Nature, 8 Jan. 1874, v. 9, p. 189–190.)

Shows that where flowers grow in masses so many bees are attracted that a strong competition arises in the gathering of nectar, in consequence of which the bees are led to perforate the flowers, that they may obtain their sweets with the least possible expenditure of time. Records observations of the sort on *lathyrus sylvestris* and *phaseolus multiflorus*, showing that the perforations in question are made at exactly the proper point to be of greatest service. *W: T.* (2368)

Darwin, C: The effects of cross and self-fertilization in the vegetable kingdom. N. Y., D. Appleton and Co., 1877. 482 p., 20×12, t 15×8.5.

"Germ. tr., by V. Carus, entitled 'Die Wirkungen der Kreuz- und Selbst-befruchtung im Pflanzenreich.' Stuttgart, E. Koch, 1877."

"Fr. tr., by E. Heckel, entitled 'Des effets de la fécondation croisée et de la fécondation directe dans le règne végétal. Ouvrage traduit de l'anglais et annoté avec l'autorisation de l'auteur.' Paris, 1877. 15 +496 p."

Rev., by Hermann Müller, entitled "Die Wirkungen der Kreuzung und Selbstbefruchtung im Pflanzenreiche." (Bot. Jahresbericht . . . Just, 1876, v. 4, p. 936-938.)

Rev., entitled, "The effects of cross and self-fertilization in the vegetable kingdom." (Journ. of botany, Mar. 1877, v. 15, n.s., v. 6, p. 87-92.)

Rev., by Asa Gray, entitled "Notice of Darwin on the effects of cross- and self-fertilization in the vegetable kingdom." (Amer. journ. sci. and arts, Feb. 1877, v. 113, s. 3, v. 13, p. 125-141.)

Rev., by Hermann Müller, entitled "Darwin's Werk: 'Ueber die Wirkungen der Kreuzung und Selbstbefruchtung im Pflanzenreich' und seine Bedeutung für unser Verständniss der Blumenwelt." (Kosmos, Apr. 1877, v. 1, p. 57-67.)

Notice of Carus' Germ. tr., under same title as tr. (Kosmos, Aug. 1877, v. 1, p. 457, 9 cm.)

The author details a very extensive series of experiments in fertilizing flowers with their own pollen and with that from other flowers either on the same or on different plants, showing that the offspring from crosses are more numerous and in every way better adapted to existence than those resulting from in and in breeding. Detailed observations on the habits of flower-visiting insects are given. *W: T.* (2369)

Darwin, C: "Des effets de la fécondation croisée et de la fécondation directe dans le règne végétal. Ouvrage traduit de l'anglais et annoté avec l'autorisation de l'auteur par Edouard Heckel. Paris, 1877. 15 +496 p."

Fr. tr., by E. Heckel, of Darwin's "The effects of cross and self fertilization in the vegetable kingdom" [Rec., 2369]. *W: T.* (2370)

Darwin, C: On the existence of two forms, and on their reciprocal sexual relation, in several species of the genus *linum*. (Journ. Linn. soc., Bot., 5 Feb. 1863, v. 7, p. 69-83, 1 fig.)

Fr. tr. (Annales des sci. nat., Bot., 1863, ser. 4, v. 19, p. 229–247.)

Describes the heterogony of the flowers, which are fertilized chiefly by small diptera. *W: T.* (2371)

Darwin, C: Fertilization of the *fumariaceae*. (Nature, 16 Apr. 1874, v. 9, p. 460, 9 cm.)

Records the behavior of insects about the flowers of certain *fumariaceae*, and discusses the change of color which the flowers of some species undergo, and its bearing upon the subject of cross-fertilization. *W: T.* (2372)

Darwin, C: On the two forms or dimorphic condition in the species of *primula*, and on their remarkable sexual relations. (Journ. Linn. soc., Bot., 21 Nov. 1861, v. 6, p. 77–96.)

Fr. tr. (Annales des sci. nat., Bot., 1863, ser. 4, v. 19, p. 204–229.)

States that the flowers are visited by humble-bees [*bombus*], *thrips*, etc. *W: T.* (2373)

Darwin, C: Observations sur l'hétéromorphisme des fleurs, et ses conséquences pour la fécondation. (Annales des sci. nat., Bot., 1863, ser. 4. v. 19, p. 204–255, pl. 12.)

Fr. tr. of C: Darwin's "On the two forms or dimorphic condition in the species of *primula*" . . . (Journ. Linn. soc., Bot., 21 Nov. 1861, v. 6, p. 77–96) [Rec., 2373], "On the three remarkable sexual forms of *catasetum tridentatum*. . ." (*op. cit.*, 3 Apr., 1862, v. 6, p. 151–157) [Rec., 2375], and "On the existence of two forms . . . in several species of the genus *linum*" (*op. cit.*, 5 Feb. 1863, v. 7, p. 69–83) [Rec., 2371]. *W: T.* (2374)

Darwin, C: On the three remarkable sexual forms of *catasetum tridentatum*, an orchid in the possession of the Linnaean society. (Journ. Linn. soc., Bot., 3 Apr. 1862, v. 6, p. 151–157.)

Fr. tr. (Annales des sci. nat., Bot., 1863, ser. 4. v. 19, p. 247–255, pl. 12, figs. A, 1, 2, and 3.)

Shows that the plants formerly known as *catasetum tridentatum*, *monachanthus viridis* and *myanthus barbatus* are respectively the male, female and hermaphrodite forms of a single species. The mode of pollination by insect agency is indicated. *W: T.* (2375)

Darwin, C: On the sexual relations of the three forms of *lythrum salicaria*. (Journ. Linn. soc., Bot., 16 June 1864, v. 8, p. 169–196.)

The trimorphic flowers of this *lythrum* are cross-fertilized by hive and humble bees [*apis mellifica* and *bombus*], and by diptera. *W: T.* (2376)

Darwin, C: On the specific differences between *primula veris*, Brit. Fl. (var. *officinalis*, Linn.), *p. vulgaris*, Brit. Fl. (var. *acaulis*, Linn.), and *p. elatior*, Jacq.; and on the hydrid nature of the common oxlip. With supplementary remarks on naturally produced hybrids in the genus *verbascum*. (Journ. Linn. soc., Bot., 19 Mar. 1868, v. 10, p. 437–454.)

Shows among other things how bees or other insects may hybridize and deteriorate species of plants. Notes some of the insect visitors of the flowers studied. *W: T.* (2377)

Darwin, C: On the various contrivances by which British and foreign orchids are fertilized by insects, and on the good effects of intercrossing. With illustrations. Lond., J: Murray, 1862. 365 p., 18×12, t 13.5×7.5; 34 figs.

"Germ. tr., by H. G. Bronn, entitled 'Ueber die Einrichtungen zur Befruchtung britischer und ausländischer Orchideen durch Insecten, und über die günstigen Erfolge der Wechselbefruchtung.' Stuttgart, 1862."

Rev., by A. Gray, entitled "Fertilization of orchids through the agency of insects." (Amer. journ. sci. and arts, 1862, v. 84, s. 2, v. 34: July, p. 138-144; Nov., p. 420-429.)

Rev., by E. F[ournier?], under full English title. (Bull. soc. bot. de France, Aug. 1862, v. 9, p. 243–246.)

2d ed., entitled "The various contrivances by which orchids are fertilized by insects. 2d ed., rev., with il." N. Y., D. Appleton & Co., 1877. 300 p., 20×12, t 15×8.5.

An exhaustive study into the relations between orchids and insects. *W: T.* (2378)

Darwin, C: The various contrivances by which orchids are fertilized by insects. 2d ed., rev., with il. N. Y., D. Appleton & Co., 1877. 300 p., 20×12, t 15×8.5.

"Germ. tr., by V. Carus, entitled 'Die verschiedenen Einrichtungen, durch welche Orchideen von Insecten befruchtet werden. Aus dem Englischen. 2. durchgesehene Auflage. Mit 38 Holzschnitten.' Stuttgart, E. Koch, 1877. 259 p."

"Fr. tr., by Ed. Heckel."

Rev., by A. W. Bennett, entitled "Remarkable plants. 2. Some curious orchids." (Nature, 22 Feb. 1877, v. 15, p. 357-359.)

Rev., by Hermann Müller, under English title. (Bot. Jahresbericht . . . Just, 1877, v. 5, p. 741-742.)

This work is in general the same as the 1st ed., "On the various contrivances by which British and foreign orchids are fertilized" . . . [Rec., 2378], but is brought up to date, and includes a list of papers bearing on the fertilization of orchids which appeared between 1862 and 1876, inclusive. *W: T.* (2379)

Darwin, C: "Die verschiedenen Einrichtungen, durch welche Orchideen von Insecten befruchtet werden. Aus dem Englischen von V. Carus. 2. durchgesehene Auflage. Mit 38 Holzschnitten. Stuttgart, E. Koch. 1877. 259 p."

Germ. tr., by Victor Carus, of Darwin's "The various contrivances by which orchids are fertilized by insects. 2d ed." . . . [Rec., 2379] *W: T.* (2380)

Darwin, C: "Die Wirkungen der Kreuz- und Selbst-befruchtung im Pflanzenreich. Aus dem Englischen von V. Carus. Stuttgart, E. Koch. 1877."

Notice, under full title. (Kosmos, Aug. 1877, v. 1, p. 457, 9 cm.)

Germ. tr., by Victor Carus, of Darwin's "The effects of cross and self fertilization in the vegetable kingdom" [Rec., 2369]. *W: T.* (2381)

Delpino, Federico. Sugli apparecchi della fecondazione nelle piante antocarpee, fanerogame. Summario di osservazioni fatte negli anni 1865–66. Firenze, 1867. 39 p., 22×13, t 17.5×10.

Discusses the pollination of flowers of many orders, and the part which insects take in it. *W: T.* (2382)

Delpino, Federico. Altri apparecchi dicogamici recentemente osservati. (Nuovo giorn. bot. ital., 1870, v. 2, p. 51–64.)

Shows the adaptation of a number of flowers to cross-fertilization by insects. *W: T.* (2383)

Delpino, Federico. Breve cenno sulle relazioni biologiche e genealogiche delle marantacee. (Nuovo giorn. bot. ital., Oct. 1869, v. 1, p. 293–306.)

Includes studies on the adaptation of species to fertilization by insects. *W: T.* (2384)

Delpino, Federico. Contribuzioni alla storia dello sviluppo del regno vegetale. 1. Smilacee. (Atti della R. università di Genova, 1880, v. 4, pt. 1, p. 1-91.)

In discussing the biological relations of the *smilaceae*, the author gives a full account of extrafloral nectar and its protective value in different groups of plants (p. 25-33), showing that the greater number of plants producing it are climbers. This association is not believed to be fortuitous, but due to the fact that the frequent contact of climbing plants with their supports brings them in the way of ants to a large degree, and thus renders any mutually beneficial adaptations between the two easy of realization. *W: T.* (2385)

Delpino, Federico. Dicogamia ed omogamia nelle piante. (Nuovo giorn. bot. ital., Apr. 1876, v. 8, p. 140-161.)

Discusses cross and self-fertilization, indicating many adaptations for securing the latter by insects and in other ways. *W: T.* (2386)

Delpino, Federico. Difesa della dottrina dicogamica. (Nuovo giorn. bot. ital., July 1878, v. 10, p. 177-215.)

Caruel having attacked the laws of cross-fertilization in flowering plants, as established by the researches of Darwin, Hildebrand, Müller, and others, the writer gives many details supporting the Darwinian belief, discussing it in its morphological, physiological and taxonomical bearings. *W: T.* (2387)

Delpino, Federico. Rapporti tra insetti e tra nettarii estranuziali in alcune piante. Estratto dal Bullettino entomologico, anno 6. Firenze, Murate, 1874. 22 p., 22×15, t 17×10.5.

Describes the extrafloral nectar glands in some twenty or more genera of plants, and their use to the plant by maintaining a body guard of insects (ants and wasps) which protect the plant from various enemies. The author quotes from Ratzeburg and others, to show the influence these insects may have. *W: T.* (2388)

Delpino, Federico. Rivista botanica dell' anno 1879. [Estratto dall' Annuario scientifico italiano. Anno 16: 1879.] Milano, Fratelli Treves, 1880. 163 p., 19×13, t 16×9.

Part 3, Biologia vegetale (p. 30-94). Contains reviews, with such comments as are suggested by the writer's own studies, of 2 papers on insectivorous plants, and of 15 papers on the fertilization of flowers. *W: T.* (2389)

Delpino, Federico. Rivista botanica dell' anno 1880. [Estratto dall' Annuario scientifico italiano. Anno 17: 1880.] Milano, Fratelli Treves, 1881. 100 p., 19×13, t 16×9.

Part 3, Biologia vegetale (p. 21-52). Contains reviews of 11 papers on the relations between plants and animals, and the fertilization of flowers, to which are added original observations by the reviewer. *W: T.* (2390)

Delpino, Federico. Ulteriori osservazioni sulla dicogamia nel regno vegetale. Parte 1a. [Dagli Atti soc. ital. sci. nat. (Milano), Oct. 1868, v. 11, p. 265-332; Aug. 1869, v. 12, p. 21-141, p. 179-233. Seduta del 28 giugno, 1868.] Milano, Giuseppe Bernardoni, 1868-1869, 243 p., 22×16, t 16×10.

Reprint of p. 189-223, entitled "Rivista monographica della famiglia delle *marcgraviaceae*." (Nuovo giorn. bot. ital., Oct. 1869, v. 1, p. 257-290.)

Dichogamy with this author and Italian writers in general is synonymous with cross-fertilization, and not with lack of synchronism in the maturity of the genitalia of flowers, as with Sprengel and most German and English writers. In the present paper the various means of securing crossing, largely by aid of insects, are discussed, the adaptations of many flowers being described. *W: T.* (2391)

Earley, W: Hive bees vs. mechanism. (Nature, 25 July 1872, v. 6, p. 242, 17 cm.)

The writer finds the weight of hive bees [*apis mellifica*] insufficient to depress the wings and keel of the sweet pea [*lathyrus*] which they visit for nectar: hence these bees do not fertilize the flowers. To obtain pollen from these flowers the bees crowd the petals in question down enough to expose the anthers. *W: T.* (2392)

Engelmann, G: The flower of *yucca* and its fertilization. (Bull. Torrey bot. club, July 1872, v. 3, p. 33, 8 cm.)

Correction, by G: Engelmann, entitled "Note from Dr. Engelmann." (Bull. Torrey bot. club, Aug. 1872, v. 3, p. 37, 13 cm.)

Describes the arrangement for fertilization, and states that this is effected by "a white moth of the genus *tortrix*." *W: T.* (2393)

Engelmann, G: Note from Dr. Engelmann. (Bull. Torrey bot. club, Aug. 1872, v. 3, p. 37, 13 cm.)

Correction of the author's "The flower of *yucca*..." [Rec., 2393]. States that the insect which fertilizes *yucca* is "*allied* to *tortrix*." *W: T.* (2394)

Ernst, A. Fertilization of *coboea penduliflora*. (Nature, 17 June 1880, v. 22, p. 148-149.)

Shows how the flowers are pollinated by nocturnal moths. *W: T.* (2395)

Evans, M. S. Notes on some Natal plants. (Nature, 19 Sept. 1878, v. 18, p. 543, 25 cm.)

Shows how an unidentified rubiaceous plant, a *polygonum*, and *tecoma capense* are adapted to cross-fertilization: the two former by insects, the last-named by honeysuckers. *W: T.* (2396)

Evans, M. S. Plant fertilization. (Nature, 30 Mar. 1876, v. 13, p. 427. 12 cm.)
Reprint. (Field and forest, July 1876, v. 2, p. 15-16.) [Rec., 912.]

Describes the fertilization by ants of the flowers of a plant related to coffee. *W: T.* (2397)

Farrer, T. H. *Lotus corniculatus.* (Nature, 26 June 1873, v. 8, p. 162, 9 cm.)

Makes some additions to his "On the fertilization of a few common papilionaceous flowers" (Nature, 17 Oct. 1872, v. 6, p. 499) [Rec., 2297] concerning this plant. *W: T.* (2398)

Forbes, H: O. The fertilization of orchids. (Nature, 7 June 1877, v. 16, p. 102. 10 cm.)
Notice, by Hermann Müller, entitled "Die Befruchtung der Orchideen . . ." (Bot. Jahresbericht . . . Just, 1877, jahrg. 5, p. 742, 2 cm.)

Noted that in Portugal the orchids — chiefly species of *ophrys* — were not fertilized, although there were numerous insects to be found. *W: T.* (2399)

Forbes, W. A. Fertilization of orchids. (Nature, 12 June 1873, v. 8, p. 121, 3 cm.)
Answer, by Hermann Müller, entitled "Probosces capable of sucking the nectar of *anagraecum sesquipedale.*" (Nature, 17 July 1873, v. 8, p. 223, 16 cm.)

Inquires if a moth with proboscis long enough to fertilize *anagraecum sesquipedale* has ever been found in Madagascar. *W: T.* (2400)

Fuckel, Leopold. Ueber die Honigabsonderung der Nebenblättchen (stipulae) bei *vicia sativa* L. (Flora, 21 July 1846, p. 417-418.)

States that his father had earlier noticed that bees gather nectar from the nodes and not from the flowers of the vetch. Describes the secreting glands. *W: T.* (2401)

Gentry, T: G: The fertilization of certain flowers through insect agency. (Amer. nat., May 1875, v. 9, p. 263-267.) [Rec., 297.]
Crit. rev., by T: Meehan, entitled "Mr. Gentry's paper on fertilization through insect agency." (Amer. nat., June 1875, v. 9, p. 374-375.) [Rec., 301].

Describes the pollination of *cucurbita*, *wistaria*, and *trifolium pratense* by insects, and the production of natural hybrids in the first mentioned genus through the agency of bees. *W: T.* (2402)

Gerard, W. R. Correlation between the odor of the phalloids and their relative frequency. (Bulletin Torrey bot. club, Mar. 1880, v. 7, p. 30-33.)

Traces the frequency of certain species of phalloids about dwellings to their dissemination by flies which feed upon the spores; records his own observations and those of others on the use of the sporiferous mucus as food by flies, ants and beetles. *W: T.* (2403)

Gerard, W. R. Spurious fungi. (Bull. Torrey bot. club, Oct. 1876, v. 6, p. 114, 3 cm.)

States that the objects on leaves of *solidago* and *aster* described by Schweinitz as fungi under the name of *rhytisma* are the galls of *cecidomyia carbonifera* O. S. *W: T.* (2404)

Goodale, G: Lincoln. Fertilization and cross-fertilization. (Trans. Mass. horticultural soc., 20 Jan. 1877, p. 23-28.)

A popular lecture on the cross-fertilization of flowers by insects, and the benefits thereby derived. *W: T.* (2405)

Gray, Asa. Arrangement for cross-fertilization of the flowers of *scrophularia nodosa.* (Amer. journ. sci. and arts, Aug. 1871, ser. 3, v. 2, p. 150-151, 9 cm.) (Journ. of botany, 1871, v. 9, p. 375.)

Describes the floral structure of *scrophularia*, and states that, according to Dr. W: G. Farlow, the flowers are fertilized by *apis mellifica.* *W: T.* (2406)

Gray, Asa. Botanical text book. Part 1. Structural botany. N.Y. and Chic., Ivison, Blakeman, Taylor & Co., 1880. 442 p., 21×14, t 17.5×9.5.

Chapter 6, Section 4. Certain adaptations of the flower to the act of fertilization, p. 215-242. Describes and figures many flowers, showing their adaptation to fertilization by insects. Appended is a brief list of works on the subject.

Chapter 3, Section 4, § 3. Leaves specialized for the utilization of animal matter. Discusses insectivorous plants, and gives a few references. *W: T.* (2407)

Gray, Asa. Botany for young people. Part 2. How plants behave. N. Y. and Chic., Ivison, Blakeman, Taylor & Co., 1875. 46 p., 19.5×15.5, t 15×12.
Rev., by H. T., under same title. (Journ. of botany, 1872, v. 10, n. s., v. 1, p. 278-279, 12 cm.)

A popular book, showing "how plants employ insects to work for them" (p. 19-40), and "how certain plants capture insects" (p. 41-46). *W: T.* (2408)

Gray, Asa. Fertilization of *gentiana andrewsii.* (Amer. nat., Feb. 1877, v. 11, p. 113, 8 cm.)

Shows that the closed gentian is adapted for cross-fertilization by humble-bees [*bombus*] which visit it. In case of their failure to visit, close fertilization is effected as previously shown in M. W. Van Denburg's "*Gentiana andrewsii*" (Amer. nat., May 1875, v. 9, p. 310-311). *W: T.* (2409)

Gray, Asa. Fertilization of orchids through the agency of insects. (Amer. journ. sci. and arts, 1862, v. 84, s. 2, v. 34: July, p. 138-144; Nov., p. 420-429.)

Notice, under same title. (Nat. hist. rev., Oct. 1863, v. 3, no. 12, p. 590-591, 7cm.)

Review of C: Darwin's "On the various contrivances by which British and foreign orchids are fertilized" . . . [Rec. 2378], with observations on the fertilization of American species. *W: T.* (2410)

Gray, Asa. Flycatching in *sarracenia.* (Amer. journ. sci. and arts, Aug. 1873, ser. 3, v. 6, p. 149-150.)

Correction, by A. Gray, with same title. (*op. cit.*, Dec. 1873, p. 467-468.)

Mentions the saccharine secretion of the leaves and its reputed stupefying effect on insects, which are macerated within the pitchers. *W: T.* (2411)

Gray, Asa. Flycatching in *sarracenia.* (Amer. journ. sci. and arts, Dec. 1873, ser. 3, v. 6, p. 467-468.)

Corrects errors in earlier paper of same title (*op. cit.*, Aug. 1873, p. 149-150) [Rec., 2411], and quotes statements of correspondents as to the insectivorous habits of the plants in question. *W: T.* (2412)

Gray, Asa. *Gentiana andrewsii.* (Bull. Torrey bot. club, Oct. 1877, v. 6, p. 179, 5 cm.)

The flowers of the plant named are cross-fertilized by *bombus.* *W: T.* (2413)

Gray, Asa. Notice of Darwin on the effects of cross- and self-fertilization in the vegetable kingdom. (Amer. journ. sci. and arts, Feb. 1877, v. 113, ser. 3, v. 13, p. 125-141.)

Notice, by H. Müller, entitled "Asa Gray. Darwin's Werk über die Wirkungen der Kreuz- und Selbst- Befruchtung im Pflanzenreiche." (Bot. Jahresbericht . . . Just, 1877, v. 5, p. 743, 5 cm.)

A very complete review of C: Darwin's "The effects of cross and self fertilization" . . . [Rec. 2369], with the addition of many observations made by the reviewer. *W: T.* (2414)

Gray, Asa. Sarracenias as flycatchers. (Amer. journ. sci. and arts, Apr. 1874, ser. 3, v. 7, p. 440-442.)

References to early literature on the insectivorous habits of pitcher plants [*sarracenia*]. *W: T.* (2415)

Gray, Asa. *Sarracenia variolaris.* (Amer. journ. sci. and arts, June 1874, ser. 3, v. 7, p. 600, 13 cm.)

Quotes a letter from Dr. J. F. Mellichamp, on the effect of the secretions of this pitcher plant on insects. *W: T.* (2416)

Gray, Asa. Structure and fertilization of certain orchids. (Amer. journ. sci. and arts, Sept. 1863, ser. 2, v. 36, p. 292-294.)

Describes the adaptations to insect fertilization of *platanthera flava* and *gymnadenia tridentata*, but records no insects as visiting the flowers. *W: T.* (2417)

Hall, I. H. Note on *hepatica acutiloba.* (Bull. Torrey bot. club, Mar. 1870, v. 1, p. 11-12, 9 cm.)

States that hive bees [*apis mellifica*] visit the flowers for nectar very early in spring. *W: T.* (2418)

Hall, I. H. *Opuntia ficus-indica*, DC. (Bull. Torrey bot. club, Feb. 1878, v. 6, p. 201-202.)

Found ants and an unknown insect in the unopened flower buds, attracted by nectar. *W: T.* (2419)

Hall, J: P. Vegetable fly trap. (Science gossip, 1879, p. 15, 10 cm.)

State that "moths, bees, &c." are captured by the flowers of the arauja [*physianthus*] and may live in this captivity for two or more days, the effect of the plant being merely mechanical detention. *W: T.* (2420)

Hart, W. E. Fertilization of *corydalis claviculata.* (Nature, 7 May 1874, v. 10, p. 5, 6 cm.)

Believes the flower slightly proterogynous, and shows how it might be fertilized by insects — which he has not seen at work. *W: T.* (2421)

Hart, W. E. Fertilization of *viola tricolor* and *v. cornuta.* (Nature, 24 July 1873, v. 8, p. 244-245, 16 cm.)

Believes the flowers of *viola tricolor* adapted to cross-fertilization by larger insects than *thrips.* Has seen them visited by *bombus* and *pieris rapae.* *V. cornuta* is adapted to fertilization by *noctuidae*, though the flowers are also visited by bees, flies, and butterflies, in the daytime. *W: T.* (2422)

Hart, W. E. Fertilization of the wild pansy. (Nature, 12 June 1873, v. 8, p. 121, 19 cm.)

Describes the structure of the flowers of *viola tricolor*, and states that they are visited by *bombus muscorum;* corrects a statement in T. H. Farrer's "On the fertilization of a few common papilionaceous flowers" (Nature, 17 Oct. 1872, v. 6, p. 499) [Rec., 2297], as to the floral structure of *lotus corniculatus.* *W: T.* (2423)

Hart, W. E. Pollen eaters. (Nature, 2 Jan. 1873, v. 7, p. 161, 7 cm.)

Has often watched flies belonging or allied to the *syrphidae*, while eating pollen of various flowers, "which they effected by a quick jerking and grinding movement of the mandibulae." *W: T.* (2424)

Hart, W. E. Pollen eaters. (Nature, 30 Jan. 1873, v. 7, p. 242, 6 cm.)

Believes that *syrphidae* in gathering pollen from *taraxacum* and other *compositae* may effect fertilization, but believes their visits injurious to some other flowers. Inquires if his former use of the word "mandibulae" (*op. cit.*, p. 161) is correct. *W: T.* (2425)

Hart, W. E. Winter fertilization. (Journ. of botany, 1872, v. 10, n. s., v. 1, p. 25-26, 11 cm.)

Crit. rev., by F. B. White, entitled "Winter fertilization by agency of insects." (Journ. of botany, 1872, v. 10, n. s., v. 1, p. 48, 8 cm.)

Notes the self fertilization of *geranium robertianum* in November. Believes, however, that insect fertilization of certain flowers may occur in winter. *W: T.* (2426)

Hayden, Christopher J. Fertilization of *dictamnus*. (Nature, 23 May 1872, v. 6, p. 60, 5 cm.)

Shows that bees fertilize the flowers. *W: T.* (2427)

Henslow, G: Note on the structure of *genista tinctoria*, as apparently affording facilities for the intercrossing of distinct flowers. (Journ. Linn. soc., Bot., 16 Apr. 1868, v. 10, p. 468, 15 cm.)

Shows that the flowers are self sterile; but had no opportunity to observe the insects which fertilize them. *W: T.* (2428)

Henslow, G: Note on the structure of *indigofera*, as apparently offering facilities for the intercrossing of distinct flowers. With additional notice of Dr. Hildebrand's paper on *medicago*, *indigofera* and *cytisus*, in the Botanische Zeitung, March 1866; and a communication from Mr. Darwin on the common broom, *cytisus scoparius*. (Journ. Linn. soc., Bot., 19 Apr. 1866, v. 9, p. 355-358.)

Describes the actions of bees while visiting the last-named species, and shows their probable influence in crossing the others. *W: T.* (2429)

Henslow, G: Note on the structure of *medicago sativa*, as apparently affording facilities for the intercrossing of distinct flowers. (Journ. Linn. soc., Bot., 16 Nov. 1865, v. 9. p. 327-329.)

Only observed *apis mellifica* on the flowers, and these insects did not have power to set free the staminal tube. *W: T.* (2430)

Hepworth, J. Notes on the rhododendron. (Science gossip, 1878, p. 177-178.)

Describes the flowers of *rhododendron* and shows their adaptation to bees, as pollinating agents, which have been observed to visit them. *W: T.* (2431)

Hildebrand, Friedrich, *see* Henslow, G:, Note on the structnre of *indigofera* ... [Rec., 2429].

Hildebrand, Friedrich. Ueber die Befruchtung von *aristolochia clematitis* und einiger anderer Aristolochiaarten. (Pringsheim's Jahrbücher für wiss. Botanik, 1866, v. 5, p. 343-358, pl. 43.)

Describes the attraction of small flies into the flowers of *aristolochia* and their detention there while the flower changes functionally from pistillate to staminate, when they are released, pollen-laden, to enter another newly opened pistillate flower, where they go through the same performance. *W: T.* (2432)

Hildebrand, Friedrich. Ueber die Befruchtung von *asclepias cornuti*. (Bot. Zeitung, 30 Nov. 1866, v. 24, p. 376-378.)

Shows how the flowers are fertilized by *apis mellifica* and *bombus;* notes the occasional capture of the former by the flowers. *W: T.* (2433)

Hildebrand, Friedrich. Ueber die Befruchtung der Salviaarten mit Hülfe von Insekten. (Pringsheim's Jahrbücher für wiss. Botanik, 1865, v. 4, p. 451-478, pl. 33.)

Describes the flowers of 14 species, taken from most of the large groups into which the genus *salvia* is divided. The species studied show a very interesting gradation between species capable of self-fertilization, or of close-fertilization by insects, and such as are self-sterile, and adapted to crossing by insects [and birds]. *W: T.* (2434)

Hildebrand, Friedrich. Ueber die Bestäubungsvorrichtungen bei den Fumariaceen. (Pringsheim's Jahrbücher für wiss. Botanik, 1869, v. 7, p. 423-471, pl. 29-31.)

Describes the structure of the flowers of *fumariaceae*, and the pollination of many by insects. *W: T.* (2435)

Hildebrand, Friedrich. Die Geschlechter-Vertheilung bei den Pflanzen und das Gesetz der vermiedenen und unvortheilhaften stetigen Selbstbefruchtung. Mit 62 Figuren in Holzschnitt. Leipzig, Engelmann, 1867. 92 p., 24×16, t 18×10.5.

Rev., by F. Delpino, entitled "Sull' opera 'La distribuzione dei sessi nelle piante e la leggè che osta alla perennità della fecondazione consanguinea' . . . Note critiche." (Atti della soc. ital. di sci. nat. [Milano], 1867, v. 10, p. 271-303.)

Shows the adaptation of many flowers to cross-fertilization by insect agency. *W: T.* (2436)

Hildebrand, Friedrich. Ueber die Nothwendigkeit der Insektenhülfe bei der Befruchtung von *corydalis cava*. (Jahrb. wiss. Botanik, 1866, v. 5, p. 359-363.)

Shows that although the stigma of a given flower is well covered with pollen which emits its tubes, no fruit is produced unless pollen is brought from another flower. This is effected by bees. *W: T.* (2437)

Hildebrand, Friedrich. Ueber die Vorrichtungen an einigen Blüthen zur Befruchtung durch Insektenhülfe. (Bot. Zeitung, 9 Mar. 1866, v. 24, p. 73-78, pl. 4.)

Describes the adaptation of *pedicularis sylvatica*, *indigofera*, *medicago*, *cytisus*, *lopezia coronata*, *schizanthus pinnatus* and *siphocampylus bicolor* to cross-fertilization by the aid of insects. *W: T.* (2438)

Hubbard, H: Guernsey. Cross fertilization of *aristolochia grandiflora*. (Amer. nat., May 1877, v. 11, p. 303-304.)

A record of observations in Jamaica. Finds this—like other species of the genus—an admirable fly-trap, detaining insects which enter the flowers in the first (♀) stage of development until after the stigmas have withered and the stamens matured, when they are allowed to escape, pollen-laden, to effect the fertilization of other and younger flowers. *W: T.* (2439)

Jackson, Jos., *jr.* *Sarracenia purpurea*, L. (Botan. gazette, July 1881, v. 6, p. 242, 4 cm.)

Flowers are fertilized through the agency of flies, "as large as the common house-fly", which visit them for pollen. *W: T.* (2440)

Kitchener, F. E. On cross-fertilization as aided by sensitive motion in musk and *achimenes*. (Journ. of botany, Apr. 1873, v. 11, n. s., v. 2, p. 101-103.) (Amer. nat., Aug. 1873, v. 7, p. 478-480.)

Shows the adaptation of these flowers to insect fertilization, but records no insect visitors. *W: T.* (2441)

Kitchener, F. E. Fertilization of the pansy; ground ivy. (Nature, 19 June 1873, v. 8, p. 143, 18 cm.)

Believes *viola tricolor* to be fertilized by *thrips*: notes two forms in the flowers of *nepeta glechoma*. *W: T.* (2442)

Kuntze, Otto. Die Schutzmittel der Pflanzen gegen Thiere und Wetterungunst und die Frage vom salzfreien Urmeer. Studien über Phytophylaxis und Phytogenesis. (Gratisbeilage zur botanischen Zeitung.) Leipzig, Arthur Felix, 1877. t-p. cover, 150 p., 23×15, t 19×11.5.

Rev., by S. M., under full title. (Journ. of botany, 1878, v. 16, n.s., v. 7, p. 121-123.)

Rev. of the first section (p. 1-91), by Hermann Müller, under same title. (Bot. Jahresbericht . . . Just, 1877, v. 5, p. 751-753.)

Considers among other things, the agency of insects in pollinating flowers, and in the dissemination of seeds; and shows how plants are protected against noxious insects. *W: T.* (2443)

Lefroy, E. C. Insects and flowers. (Science gossip, 1871, p. 258, 7 cm.)

States that butterflies have a decided preference for flowers colored similarly to themselves. *W: T.* (2444)

Lefroy, E. C. Insects and flowers. (Science gossip, 1872, p. 21, 7 cm.)

States that butterflies are largely guided in their choice of flowers on which to settle, by color, choosing such as are protective, as when alighting on leaves, etc. *W: T.* (2445)

Leggett, W: H. *Apocynum.* (Bull. Torrey bot. club: 1872, v. 3, p. 46, 49-50, 53-55; 1873, v. 4, p. 1-2, 23.)

Describes the adaptation of flowers of *apocynum* to fertilization by insects, and the capture of such as are too small to remove the pollen-masses. *W: T.* (2446)

Leggett, W: H. Bees puncturing flowers. (Bull. Torrey bot. club, July 1872, v. 3, p. 33-34, 10 cm.)

Notes the perforation of flowers of several species of *dicentra* by *bombus*, which steals their nectar through the openings thus made. *W: T.* (2447)

Leggett, W: H. *Cassia.* (Bull. Torrey bot. club, Aug. 1877, v. 6, p. 171, 3 cm.)

States that the flowers are visited by *bombus*. *W: T.* (2448)

Leggett, W: H. [*Ctenucha virginica* captured by flowers of *apocynum androsaemifolium*.] (Bull. Torrey bot. club, July 1874, v. 5, p. 32.) [Rec., 145 *a*.] *W: T.* (2449)

Müller, Hermann. Berichtigung der von W. Breitenbach gegebenen Erklärung der Bestäubungseinrichtung von *arum ternatum*. (Bot. Zeitung, 19 Dec. 1879, v. 37, c. 838-839, 35 cm.)

Crit. rev. of W: Breitenbach's "Die Blütheneinrichtung von *arum ternatum*" (Bot. Zeitung, 24 Oct. 1879, v. 37, c. 687-692) [Rec., 2361]. Shows that the plant is adapted to cross-fertilization and not to close-fertilization by insects. *W: T.* (2450)

Newlyn, G: The development of specially adaptive appliances in plants. (Science gossip, 1878, p. 156-158.)

Describes the protandry and structure of the flowers in *schizanthus papilionaceus*, and their adaptation to insects as agents in their cross-fertilization. *W: T.* (2451)

Pim, Greenwood. A remarkable garden plant. (Science gossip, 1878, p. 55-57.)

Describes the adaptation of the flowers of *thunbergia alata* to cross-fertilization by insects with long proboscides. *W: T.* (2452)

Plarr, Mary J. Bees and flowers. (Nature, 28 Jan. 1875, v. 11, p. 248-249, 5 cm.)

Notes the perforation of flowers of the snap-dragon by [humble?] bees [*bombus?*]. *W: T.* (2453)

Ráthay, E. Ueber nectarabsondernde Trichome einiger Melampyrumarten. Mit 1 Tafel. Aus dem 81. Bande der Sitzb. der K. Akad. der Wissensch., 1 Abth., Feb.-Heft, Jahrg. 1880. 23 p., 1 pl., 24×16, t 18×10.

Abstract, by H. Müller, under same title. (Bot. Jahresbericht . . . Just, 1879, v. 7, p. 127-128.)

From a study of the extrafloral nectar glands and the insects which feed on their secretion, the writer is led to reject the views of Kerner, Belt and Delpino, as to the use of such organs — at least so far as *melampyrum* is concerned. He has no hypothesis of his own to substitute for those rejected. *W: T.* (2454)

Ricca, Luigi. Alcune osservazioni relative alla dicogamia nei vegetali, fatte sulle Alpi di Val Camonica nell'anno 1870. (Atti della soc. ital. di sci. nat. [Milano], 18 Dec. 1870, v. 13, p. 254-264.)

Describes the floral structure of a considerable number of species, and their fertilization by insects. *W: T.* (2455)

Ricca, Luigi. Contribuzioni alla teoria dicogamica. Osservazioni sulla fecondazione incrociata de' vegetali alpini e subalpini fatte nelle Alpi della somma Val Camonica l'anno 1871. (Atti della soc. ital. di sci. nat. [Milano], 31 Dec. 1871, v. 14, p. 245-264.)

Additional observations on the pollination of some of the plants noted in the author's "Alcune osservazioni relative alla dicogamia . . ." (*op. cit.*, 18 Dec. 1870, v. 13, p. 254-264) [Rec., 2455], and added observations on others. *W: T.* (2456)

Riches, J. T. The arrangements for cross-fertilization in the *delphinium*. (Science gossip, Nov. 1877, p. 248-249.)

Describes the structure of the flowers as an adaptation to fertilization by bees. States that the nectar spur is perforated by ants and by short-tongued *bombus*. *W: T.* (2457)

Riches, J. T. Fertilization in *cypripedium*. (Science gossip, 1876, p. 125-126.)

Describes the adaptation of the flowers to pollination by flies, as had previously been done by Delpino. *W: T.* (2458)

Riley, C: Valentine. On the oviposition of the yucca moth. (Amer. nat., Oct. 1873, v. 7, p. 619-623) [Rec., 1992].

Abstract, by the author, under same title. (Trans. St. Louis acad. sci., 1873, v. 3, p. 208-210.)

Shows how the flowers are pollinated while *pronuba yuccasella* is engaged in piercing the ovary and laying her eggs. *W: T.* (2459)

Rohrbach, Paul. Ueber den Blüthenbau und die Befruchtung von *epipogium gmelini*. Mit zwei lithographirten Figurentafeln. Eine von der philosophischen Facultät der Georg-August-Universität zu Göttingen gekrönte Preisschrift. Göttingen, 1866. t.-p., 21 p., 1 pl., 26×22, t 20×14.

Describes the structure of the flowers of this orchid, and their pollination by insects. *W: T.* (2460)

Rusby, H: H. Cross-fertilization in *cereus phoeniceus*. (Bull. Torrey bot. club, Aug. 1881, v. 8, p. 92-93, 16 cm.)

Describes the structure of the flowers, and the actions of ants and grashoppers which visit them. *W: T.* (2461)

Slater, J. W. On insects destroyed by flowers. (Trans. entom. soc. Lond., 2 Apr. 1879, Proc., p. 9-10.)

Notes the noxious effect of the nectar of *dahlia*, *passiflora*, *fritillaria* and *nerium* on insects. *W: T.* (2462)

Smith, Sidney Irving. Fertilization of *cypripedium spectabile* and *platanthera psycodes*. (Proc. Bost. soc. nat. hist., 4 Nov. 1863, v. 9, p. 328-329.)

Small flower-beetles visit the first for nectar; the second is fertilized by *sesia* and by *papilio asterias*. *W: T.* (2463)

Sprengel, Christian Konrad. Das entdeckte Geheimniss der Natur im Bau und in der Befruchtung der Blumen. Mit 25 Kupfertafeln. Berlin, bei Friedrich Vieweg dem aeltern, 1793. 222 p. (double columns), 26×22, t 21×17.

Discusses the fertilization of many genera of flowering plants by insect agency. *W: T.* (2464)

Spruce, A. Insect fertilization. (Science gossip, 1872, p. 89. 7 cm.)

Describes the cross-fertilization of *mauritia carara* by insects attracted by nectar. *W: T.* (2465)

Taylor, J. E. Flowers, their origin, shapes, perfumes and colors. Il. with 32 col. fig. by Sowerby, and 161 woodcuts. Bost., Roberts Bros., 1878. 347 p., 18×12, t 14.5×8.5.

Rev., by H. Müller, entitled "J. E. Taylor über Blumen, ihren Ursprung, ihre Gestalten, Gerüche und Farben." (Kosmos [Leipzig], May 1879, bd. 5, p. 149-157. 289 cm.) [Rec., 2113].

A semi-scientific discussion of the development of flowers as we find them at the present time, and their different modes of pollination: with chapters on the dispersion of colored and fleshy fruits, etc., and the means of protection of plants against injurious animals. *W: T.* (2466)

Thomé, O: Wilhelm. Das Gesetz der vermiedenen Selbstbefruchtung bei den höheren Pflanzen. Mit in den Text gedruckten Illustrationen. Cöln und Leipzig, Mayer, 1870. t.-p. cover, t.-p., 46 p., 20×13, t 15×8.

A brief popular résumé of the work of Sprengel, Darwin, Hildebrand, Delpino and others. *W: T.* (2467)

Todd, James E. On certain contrivances for cross-fertilization in flowers [Rec., 1709].

Extract, entitled "Cross fertilization in *lobelia syphilitica*." (Bot. gazette, Feb. 1879, v. 4, p. 124-125, 18 cm.)

Describes the arrangements tending to secure crossing in *iris*, *martynia*, *pentstemon*, *gladiolus* and *lobelia* by insects. *W: T.* (2468)

Trelease, W: On the fertilization of *calamintha nepeta*. (Amer. nat., Jan. 1881, v. 15, p. 11-15, 2 fig.)

Shows how the flowers are adapted to profit by the visits of hymenoptera, and enumerates insects collected on them. *W: T.* (2469)

Trelease, W: On the fertilization of *euphorbia* (*poinsettia*) *pulcherrima*. (Bull. Torrey bot. club, Sept. 1879, v. 6, p. 344-345.)

Abstract, by H. Müller, entitled "Ueber die Befruchtung von *euphorbia* (*poinsettia*) *pulcherrima*." (Bot. Jahresbericht . . . Just, 1879, v. 7, p. 137-138, 5 cm.)

Describes the adaptation of the flowers to fertilization by insects. Finds their nectar very attractive to ants in a greenhouse. *W: T.* (2470)

Trelease, W: Flowers and their visitors. (Cornell review, Feb. 1880, v. 7, p. 194-196.)

A popular essay on the adaptations of flowers to cross-fertilization by insects and other animals, with notes on the habits of the latter. *W: T.* (2471)

Trelease, W: The foliar nectar glands of *populus*. (Bot. gazette, Nov. 1881, v. 6, p. 284-290, 6 fig.)

Describes the nectar glands at the base of the leaves of many poplars, discussing their structure and homology, and their biological significance. Enumerates the insects attracted by the secretion of these organs, and records his observations on their actions while on the plant. *W: T.* (2472)

Trelease, W: *Impatiens fulva*, action of bees toward. (Bull. Torrey bot. club, Feb. 1880, v. 7, p. 20-21, 12 cm.)

Describes the behavior of bees while collecting nectar normally, and when taking advantage of perforations in the corolla. *W: T.* (2473)

Trelease, W: Insects as unconscious selectors of flowers. (Amer. nat., Apr. 1879, v. 13, p. 257-260.)

Abstract of H. Müller's "Die Insecten als unbewusste Blumenzüchter" (Kosmos, 1878, v. 3: July, p. 314-337; Aug., p. 403-426; Sept., p. 476-499). *W: T.* (2474)

Trelease, W: Nectar, its nature, occurrence, and uses. Extracted from the Report on cotton insects by J. Henry Comstock, Entomologist to the U. S. Department of agriculture. [Washington, 1880.] t.-p. cover, p. 319-343, pl. 3, 23×18, t 20×11.

Abstract, by H. Müller, with same title. (Bot. Zeitung, 29 Oct. 1880, v. 38, c. 748-749, 24 cm.)

Abstract, by F. Delpino, entitled "Nettarii estranuziali" (p. 23-24), and "Impollinazione e fecondazione nel cotone e in altre specie" (p. 41-42). (Rivista botanica, 1880.)

Abstract, by H. Müller, entitled "Nectar, was er ist, und einige seiner Verwendungen." (Bot. Jahresbericht . . . Just, 1879, v. 7, p. 123-125.)

Considers nectar and nectaries, floral and extrafloral, and their use in attracting insects and other animals which cross-fertilize the flowers, serve as a body-guard for the protection of the plant against injurious animals, or are captured and digested or macerated for the nutrition of the plant. A list of papers on the mutual relations between flowers and insects, etc., is appended. *W: T.* (2475)

Trelease, W: Note on the perforation of flowers. (Bull. Torrey bot. club, June 1881, v. 8, p. 68-69, 25 cm.)

Records the perforation of the corollas of certain flowers by bees, ants and wasps, which rob them of their nectar. *W: T.* (2476)

Trelease, W: Where honey comes from. (Amer. bee journ., 1880, v. 16: Mar., p. 137-139; Apr., p. 184; May, p. 232-233; June, p. 271-272; Aug., p. 386-387.)

Brief description of the nectar producing parts—floral and extrafloral—of several plants; with observations on the habits of insects when collecting nectar, and on honey-dew. *W: T.* (2477)

Treviranus, Ludolph Christ. Ueber Dichogamie nach C. C. Sprengel und Ch. Darwin. (Bot. Zeitung, Jan. 1863, v. 21, p. 1-7, 9-16.)

Discusses the cross-fertilization of flowers by insects, going into details especially in the *papilionaceae*, *primulaceae* and *orchidaceae*. *W: T.* (2478)

Trimen, Roland. On the fertilization of *disa grandiflora*. (Journ. Linn. soc., Bot., 4 June 1863, v. 7, p. 144-147.)

Describes the structure of the flowers, and believes them to be fertilized by "some day-flying hymenopterous or lepidopterous insect," which was extremely rare in its visits where his observations were made (So. Africa). *W: T.* (2479)

Trimen, Roland. On the structure of *bonatea speciosa*, with reference to its fertilization. (Journ. Linn. soc., Bot., 1 Dec. 1864, v. 9, p. 156-160, pl. 1.)

Describes the adaptation of the flowers to fertilization by insects, but has never seen the latter at work, his studies having been made on greenhouse plants. *W: T.* (2480)

Unger, Fr. Ueber Zuckerdrüsen der Blätter und einige von den Blättern überhaupt ausgehende Zuckerabsonderungen. (Flora, 7 Nov. 1844, p. 703-714.)

Notes on honey dew, p. 710-714. *W: T.* (2481)

Weale, J. P. Mansel. Notes on some species of *habenaria* found in South Africa. (Journ. Linn. soc., Bot., 3 Nov. 1870, v. 13, p. 47-48.)

Shows the adaptation of the flowers to fertilization by nocturnal insects. *W: T.* (2482)

Weale, J. P. Mansel. Notes on a species of *disperis* found on the Kageberg, South Africa. (Journ. Linn. soc., Bot., 3 Nov. 1870, v. 13, p. 42-45.)

Believes the flowers adapted to fertilization by small bees or beetles, but has not observed them at work. *W: T.* (2483)

Weale, J. P. Mansel. Observations on the mode in which certain species of *asclepiadeae* are fertilized. (Journ. Linn. soc., Bot., 3 Nov. 1870, v. 13, p. 48-58.)

Describes the fertilization by insects of the African genera *gomphocarpus*, *xyomalobium?*, *cissus*, *eucormis*, *pachycarpus*, *periglossum* and *cordylogyne*. *W: T.* (2484)

ENTOMOLOGICAL ITEMS.

THE WELL-KNOWN arachnologist John Blackwall died, 11 May 1881, at the age of 92 years. — *Zool. Anz.*, 27 June 1881, jahrg 4, p. 340.

PROF. DR. ERNST GUSTAV ZADDACH, Director of the Zoological Museum of Königsberg, died 5 June 1881, in Königsberg, Prussia.

DR. CHRISTOFFER AURIVILLIUS has been appointed director of the entomological division of the royal museum in Stockholm.— *Zool. Anzeiger*, 10 Jan. 1881, jahrg. 4, no. 73, p. 24.

MISS EMILY A. SMITH, assistant state entomologist of Illinois, was elected a foreign member of the Entomological society of London, 1 Sep. 1880. — *Entom. mo. mag.*, Oct. 1880, v. 17, p. 120.

WALTER PHILIP WESTON, a zealous and extremely able entomologist, died in Putnam, London, England, 20 Feb. 1881, in his 29th year.—*Zoologischer Anzeiger*, 28 March 1881, jahrg. 4, no. 79, p. 168.

DR. O. KRANCHER, of the Zoologisches Institut, Leipzig, Germany, wishes to exchange lepidoptera (including inflated larvae) and coleoptera of Germany (especially of Saxony) for those of other lands.

ARTHUR GARDINER BUTLER has been appointed assistant keeper at the British Museum, as the succsssor of Frederick Smith, deceased.—*Zoologischer Anzeiger*, 25 April 1881, jahrg. 4, no. 81, p. 216.

GABRIEL KOCH, an esteemed entomologist, well known by numerous works, especially upon the geographical distribution of lepidoptera, died in Frankfort-on-Main, 22 Jan. 1881, in his 74th year. — *Zool. Anzeiger*, 28 March 1881, jahrg. 4, no. 79, p. 168.

ON THE 25TH of April 1881, an "insectarium" was opened in the gardens of the Zoological Society of London, for the rearing and exhibition of insects, under the charge of Mr. W. Watkins, Superintending Entomologist. — *Zool. Anz.*, 11 July 1881, jahrg. 4, no. 87, p. 362.

SOCIETY MEETINGS.

THE REGULAR Meetings of the Cambridge Entomological Club will be held at 7.45 p.m., on the days following:—

14 Oct. 1881.
11 Nov. “
9 Dec. “
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10 Mar. 1882.
14 Apr. “
12 May “
9 June “

B: PICKMAN MANN, *Secretary.*

THE REGULAR meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following:—

26 Oct. 1881.
23 Nov. “
28 Dec. “
25 Jan. 1882.
22 Feb. 1882.
22 Mar. “
26 Apr. “
24 May “

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THE REGULAR meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following:—

14 Oct. 1881.
11 Nov. “
9 Dec. “
13 Jan. 1882.
10 Feb. “
10 Mar. 1882.
14 Apr. “
12 May “
9 June “

JAMES H. RIDINGS, *Recorder.*

THE SEMI-ANNUAL meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following:—

12 Dec. 1881.
12 June 1882.

JAMES H. RIDINGS, *Rec. Sec'y.*

THE REGULAR monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following:—

6 Sept. 1881.
4 Oct. “
1 Nov. “
6 Dec. “
3 Jan. 1882.
7 Feb. “
7 Mar. “
4 Apr. “

G: H. BOWLES, *Secretary.*

PRIZE ESSAYS.

DUE 15 OCT. 1882.—Life-histories of *Sclerostoma syngamus* and of *Strongilus pergracilis.* See PSYCHE, v. 3, p. 59.

ADVERTISEMENTS

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PSYCHE

BIBLIOGRAPHICAL RECORD.

(*Continued from page* 256.)

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Nos. 1249 to 1266 are from **Can. Entom.**, 1877, v. 9.

* 1249. **Bailey**, James Spencer, *M.D.* Catocalae taken at sugar at Center, N. Y. (Can. entom., 1877, v. 9, p. 215–218.)

List and enumeration of specimens of about 40 species of Catocala taken each day during July and August, at Center, Albany Co., N. Y. [Dec. 1877.] [Compare Rec., no. 955.]

* 1250. **Morris**, J: G. What is the function of the forceps in Forficula? (Can. entom., 1877, v. 9, p. 218–219.)

The forceps serve to lift the elytra, before flight. [Dec., 1877.]

* 1251. **Hoy**, P. R. Erebus zenobia. (Can. entom., 1877, v. 9, p. 219.)

Male and female taken 6–15 Sept., at Racine, Wisc.; southern character of the fauna at Racine. [Dec., 1877.] [Author's name wrongly given as P. A. Hoy.]

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ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

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October—December, 1881.

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PSYCHE.

FRAGMENTS OF THE COARSER ANATOMY OF DIURNAL LEPIDOPTERA.

1. THE LARVA OF *DANAIS PLEXIPPUS*, OF NORTH AMERICA.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

So very little is known of the points in which different lepidoptera agree or disagree in their internal anatomy, that, although very fragmentary, I venture to publish the following accounts of dissections of caterpillars and chrysalids of butterflies, made about ten years ago, more in the hope of calling attention to the need of work of this kind than of directly contributing to any general statements deducible from the observations.

The literature of the subject is exceedingly scanty. Swammerdam in his Biblia naturae (1737) gives illustrations and descriptions of the internal anatomy of the larva of *Aglais urticae;* Herold in his Entwickelungsgeschichte der Schmetterlinge (1815) gives admirably full details of the anatomy of both larva and pupa of "*Pieris brassicae*"; Newport gives a section on the Development of the nervous column of "*Vanessa urticae*" in the Philosophical transactions for 1834 (repeated in Todd's encyclopaedia, art. Insecta); and on the Transformations of the tracheae in the same insect in the Philosophical transactions for 1836 (also repeated as above); Brandt also figures the metamorphoses of the nervous system of the same species in the Horae societatis entomologicae rossicae for 1879, v. 15, pl. 14; and in my recent volume on butterflies, quoted below, I have given a brief account of the anatomy of larvae of butterflies in general and of the changes the organs undergo in passing through the pupal condition. So far as I am aware, these are all the notices that have been published of the internal anatomy of the earlier stages, and, as will be seen, they cover a very narrow field, treating, with the exception of my little book, of only two species.

My studies were mostly confined to half a dozen insects, which will be separately treated, commencing with the highest, the account of which will also be fullest.

A good illustration of the general disposition of the organs of the caterpillar of *Danais plexippus*, drawn on a side view by Mr. Edward Burgess, will be found in my recently published book on butterflies,* fig. 78, and this may be readily used in connection with the following description.

---

*Butterflies: their structure, changes and life histories, with special reference to American forms. ... New York. Henry Holt & Co., 1881. 8°.

Muscular system. The head is mostly filled with conical muscular bundles, attached by their bases to the upper and lateral portions of the posterior two-thirds, and to some extent to the upper portion of the anterior third of the vault of the head; the apices of these conical masses converge toward the middle longitudinal line of each hemisphere, and then pass downward, terminating, in the lower half of the head, in a white, glistening, tendinous cord fully a millimetre long, lying just behind the optic nerve and reaching down into the mandibles, which they serve to close. The extensors of the mandibles are attached behind and below the eyespecks, and pass directly to the outer base of the mandibles, which they enter by means of a tendon attached to the interior wall of the same. The retractors of the labrum are slight, flat, muscular ribbons, attached at one extremity along the whole of its upper interior edge and at the other to the facial triangle; the labrum is drawn inwards by a double muscle, which starts above from its attachment along each side of the median suture above the facial triangle, and passes freely downwards, the muscles of the two sides confluent and together 0.38 mm. broad, diminishing in breadth downward, and terminating in a single tendon attached to the middle of the labrum.

A band or ribbon, made up of simple, longitudinal, parallel muscular fibres, collected into two contiguous strips, the inner the narrower, runs from one end of the body to the other, near the skin, between the spiracles and the ventral line of the body; each is made up of a series of bands, one to each segment, extending across its entire length, and they are permeated by minute tracheal vessels running mainly at right angles to the direction of the fibres; from the anterior end of the inner strip of each segment, a slender muscular strap runs obliquely to the middle of the ventral line of the segment. Above the spiracles, on each side, are three muscular ribbons, the lowermost lying nearer the integument than the others, its lower edge touching the base of the tracheae. Beneath all these longitudinal bands, as seen from within, *i. e.*, lying nearer the integument, and at the anterior edge of each segment, a narrow transverse belt encircles the whole body, passing at the stigmatal line over the longitudinal tracheal vessel which unites two contiguous spiracles, and strapping it to the integument.

The flexor muscles of the true legs originate in the body just beneath the origin of the outer of the two longitudinal muscular ribbons of the ventral surface of the body, and extend to the opposite wall of the segment. The muscles of the prolegs consist of flat bands forming a muscular coating to the walls of the legs, passing in a direct line downward, narrowing as they go; they do not cross each other, nor pass to opposite sides of the legs, but are entirely simple.

Passing now to the muscles attached to the internal organs, we find the coating of the stomach, which is a mere film, overlaid by delicate parallel strips of muscular fibres crossing diagonally in opposite directions; besides these there are longitudinal muscles arranged in sets, each set separated from its neighbors by an interval of about one millimetre, and composed of four slender bands, traversing the entire length of the stomach; those next the dorsal and ventral lines are more prominent than the others and on the anterior are larger than on the posterior half; the sets on the dorsal line are united into a double band at the anterior extremity and pass to the oesophagus, where they are more widely separated; the oesophagus is provided also with other longitudinal muscles, and to a less extent with transverse encircling bands. The small intestine is covered with both transverse and longitudinal bands of thick white and glistening muscular tissue; at its anterior end especially, where the alimentary canal is greatly constricted, it is covered thickly with short longitudinal muscles, whose hinder extremities dovetail into other longer sets; besides these, there arise from the middle of the posterior end of the intestine a number of parallel bands of muscular fibre, which embrace it diagonally, passing around to the ventral surface of its anterior extremity; starting just in front of the posterior insertion of these, and interlacing with them at right angles, is another shorter set of parallel muscles, whose other extremities are attached to the body-wall; still further, a set of four independent parallel muscular bands passes beneath and supports the posterior end of the small intestine, reaching horizontally from the middle of one side of the eighth abdominal segment to the opposite. The colon is furnished simply with longitudinal and transverse muscular bands, heavier than those on the stomach-wall.

Digestive system. The oesophagus is a simple, straight, equal tube 1.5 mm. long, terminating posteriorly in a larger portion swollen in the middle and better provided with muscular bands, 3.5 mm. long and 1.75 mm. broad — a sort of crop, which extends part way into the second thoracic segment. The stomach extends from the middle of the second thoracic to the middle of the seventh abdominal segment and of course varies in size according to the amount of food the creature has swallowed; usually it is about 4 mm. in diameter; the proper wall of the stomach seems to be the merest film, traversed by muscular fibres, which, by lines not deeply impressed, divide the surface into narrow, rounded, transverse, parallel lobes, reaching from the middle of the upper and under surfaces to the middle of each side, and which alone prevent the perfectly free and direct posterior motion of the contents. The stomach itself, however, may be wholly withdrawn, without rupture, from this investing muscular tissue. At the middle of the seventh abdominal segment, the alimentary canal suddenly tapers, and the small intestine commences, extending half-way to the end of the body and consisting of a straight cylindrical tube 2.25 mm. in diameter, surrounded by thick walls of muscular tissue, the longitudinal bands of which mold the interior walls into very prominent longitudinal ridges. The colon is a simple straight tube of the same size as the intestine but capable of considerable expansion, and with a smooth inner surface.

The salivary glands are a pair of long straight, flat ribbons, arising from each side of the anterior extremity of the oesophagus and extending backward along the alimentary canal; they are 4.75 mm. long, tapering slightly and regularly to a bluntly rounded tip, being 0.34 mm. broad near the base and 0.14 mm. broad close to the tip; they resemble flattened, braided cords, being compressed along the median line, while each side is regularly and deeply excised at frequent intervals, producing bead-like lateral prominences.

The malpighian vessels originate as slender tubes, one on each side of the middle of the anterior half of the intestine; the tube gradually enlarges, and at a distance of 2 mm. from the origin subdivides into three branches (the under branch originating just before the other two), which are strongly waved or crenulated cords, and are, throughout, nearly or quite as large as the tube at its very origin; the under branch passes forward in a tortuous course. above the nervous cord, along and in contact with the under outer surface of the stomach, as far as the middle of the first abdominal segment, where it bends upon itself and returns in a similar manner, a little higher up, to the point from which it started; the two other branches, which are a little smaller than the first, extend forward and then backward in a similar manner, one passing along the upper outer portion of the stomach as far as the second abdominal segment, and then returning, the other along the side of the stomach to the middle of the first abdominal segment; all three branches pass outside the tracheal tubes which invest the stomach, and when each has returned to the point from which it started, the extremities of the three threads are collected with those of the opposite side, in a single intricate and convoluted mass enveloping the intestine, and covering also the whole surface of the colon with their more delicate terminal threads. When the posterior part of the alimentary canal is pressed, whitish particles can be seen to move in an irregular manner within the malpighian vessels.

Respiratory System. The tracheae of the first abdominal segment are larger and branch more extensively than those of any other segment, their ramifications extending to the anterior extremity of the stomach; while those of the third thoracic segment are small and comparatively inconspicuous and are connected with those of the first abdominal segment by only a small longitudinal canal; the first thoracic segment bears, however, an extensive bunch of tracheae, which is connected with that of the first abdominal segment by a long longitudinal canal, as large as many of the main branches of these two segments.

The anterior branch of this bunch in the first thoracic segment supplies the head; it passes upward on each side along the hinder edge of the head, until it meets that of the opposite side, when the two join so strongly that considerable force is required to part them; and the only mark of separation is a pale line on the dusky surface. As soon as they meet they bend toward the head, separate again and run side by side beneath the muscular mass which occupies most of the head, over the double cephalic ganglion and curve over toward the labrum. Before these two opposite branches first unite they emit from their anterior surface similar parallel branches, which also run beneath the muscular mass toward the anterior and lower part of the head; some curve upward and embrace the muscular mass from below; half way between the spiracle and the top of the head, this arching branch emits from its posterior surface a slender offshoot, which, together with another branch, coming almost direct from the spiracle, passes toward the tracheae of the opposite side, unites at the median line with a similar set from the opposite tracheae, and then terminates.

Circulatory system. The dorsal vessel is a straight tube, lying along the middle of the back, next the integument, and seems to be composed of an excessively delicate, whitish, pellucid film, is scarcely 0.5 mm. in diameter, uniform throughout, and terminates at the very end of the body in a well rounded tip.

Nervous system. Viewed from above, the cephalic ganglia consist of a pair of short, obovate, nearly globular lobes, closely joined by their inner edges; they are situated in the very middle of the head, just above the commencement of the alimentary canal, and on a level, above, with the top of the frontal triangle. From the lower anterior outer angle of each lobe, the optic nerve, large at base, but gradually tapering beyond, passes downward, forward, and outward, in a straight course toward the ocelli; as it reaches them it expands into a broad field comprising the ocelli,—black conical masses, their apices plunged in the nervous tissue forming the field. Just behind the origin of the optic nerve another independent nerve arises, extending to the upper portion of the tendinous cord which terminates the great muscular mass of the head and moves the mandibles. A little further removed from the optic nerve, and on the lower anterior edge of each lobe, a little within the middle, another slender nerve arises, which runs in a straight course to the base of the antennae.

From the lower outer edge of each cephalic lobe a nervous cord passes downward and a little backward, the two embracing the oesophagus, and then converges until they unite in the suboesophageal ganglion, a horizontal lenticular disk, situated at the base of the head just above its hinder edge; just beneath the oesophagus these embracing cords are united by a cross thread; this suboesophageal ganglion throws out lateral nerves, directed forward and outward, and is strapped in its place by transverse muscles, one just in front and another just behind it, which originate together on the floor of the body; and the hinder of which is strengthened on each side by a secondary muscle, which runs backward beside the cord for a short distance, divaricating slightly.

The ganglia of the body-segments are situated in or near, generally a little in advance of, the middle of each segment, as far as the seventh abdominal segment, where there is a pair, in close proximity, one behind the other, and with these the nervous cord terminates. All the ganglionic disks are connected by a pair of ribbons, generally lying in such close proximity as to appear to be single and straight, but anteriorly they are separated somewhat widely.

In leaving the suboesophageal ganglion, the nervous ribbons run nearly parallel, or only slightly curved outward, to the first body-ganglion. Starting again close together at the middle of the posterior border of the first ganglion they diverge in straight lines, but very gradually, for fully two-thirds the distance to the second ganglion (which is twice as far removed from the first as the first is from the suboesophageal ganglion), where they are nearly twice as far apart as the width of the first ganglion, and then converge more rapidly and enter the second ganglion at its outer anterior border. The distance from the second to the third ganglion is effected in a similar manner, the distance from the second ganglion to the point of greatest divergence being about equal to the distance between the first and second ganglia. The fourth ganglion is but little removed from the third, being in fact nearer to it than the latter is to the point of greatest divergence of the ribbons in advance of it; between these two ganglia the ribbon is straight, slightly longer than broad, broader than at any point posteriorly, and its separation into two cords is not readily seen. Behind this the ganglia are nearly equidistant (up to those of the seventh abdominal segment) and connected by a straight double ribbon, scarcely broader than either one of the cords between the second and third ganglia, and which is seen to be double only by the slight divergence of the cords in advance of each ganglion as they enter it. The last ganglion is situated in the seventh abdominal segment, just posterior to the tenth ganglion; indeed the two appear almost to coalesce at their adjoining edges; the eleventh is slightly the larger of the two. From the second abdominal segment backward, the nervous cord does not come in direct contact with the alimentary canal, but considerable fatty tissue is interposed between them; in advance of this, however, the reverse is the case, the fatty tissue appearing as if strapped in its place between the nervous cord and the integument by the branches of the former.

From each side of each abdominal ganglion two lateral nerves are emitted, the anterior at right angles, the posterior in a slightly posterior direction, and at their bases the two are connected by a delicate film. In the thoracic segments a similar rule holds, but in the first ganglion only the anterior lateral nerve is present, and it is directed forward; the third ganglion on the other hand follows the rule of the abdominal ganglia, while in the second, the nerves are confluent at their origin, directed at right angles outward, and almost immediately diverge at right angles to each other, one forward, the other backward. In addition to the lateral nerves, the terminal ganglion is furnished with two pairs of longer and stouter posterior nerves, reaching into the hinder segments, the outer cords trending somewhat outward.

Silk vessels. These, which have their outlet upon the labium, consist first of a delicate thread running along the sides of the alimentary canal in a tortuous manner to the middle of the second thoracic segment; here, at the lower portion of the sides of the stomach, they thicken rapidly and form the second portion, a slender tube of uniform size, running in a straight course beside and close to the stomach as far as the middle of the third abdominal segment; here it doubles upon itself and returns to the middle of the preceding segment, again repeating the curve in a reverse direction for half the distance, and then passes upward to the upper surface of the stomach and continues in a tortuous course, still hugging the alimentary canal, as far as the sixth abdominal segment, where it terminates in a very slender straight thread, by which it is connected with the sides of the intestine. The length of the basal thread is 12 mm., covering a distance of 4 mm.; the length of the thickened portion during its course on the under surface of the stomach is 18 mm.; during its tortuous course above, 35 mm.; its normal thickness, 0.8 mm., is attained within a distance of 2 mm. from the point of thickening.

Male generative organs. The testes are situated in the middle of the dorsum of the fifth abdominal segment directly above and upon the stomach; they are soft, plump, kidney-shaped, compound organs, 2.5 mm. long, of a bluish-purple color, covered by an exceedingly thin whitish investment, concealing the color of the interior as by a pale bloom. In a longitudinal row along the middle of the inner side of each half, there are four minute roundish spots of a deeper color, each communicating with a separate chamber within, separated from the others by a thin partition wall; the middle pair of chambers is smaller than the outer one, and they are all filled with a grayish granular matter. From the anterior extremity of each testis runs a short white thread, not half so long as the testis, and thickened in the middle and at the end. Just behind the hindmost spot of each side, a delicate pellucid thread arises, which passes posteriorly and a little downward until opposite the spiracle of the sixth abdominal segment; here it plunges downward toward it, and passing through the mass of tracheae to those of the seventh segment, sweeps around toward the medio-ventral line of the body, and, passing through an independent muscular bundle scarcely larger than itself, which stretches transversely across the body at this point, enters a whitish sac about 0.75 mm. long, situated just beneath the termination of the intestine; the threads are about 13.5 mm. long and 0.03 mm. in diameter.

2. THE PUPA OF *DANAIS PLEXIPPUS*, OF NORTH AMERICA.

All the dissections were made of specimens either seven or nine days in chrysalis.

Digestive system. The oesophagus is a mere thread-like vessel 0.10—0.15 mm. in diameter, and runs straight to the stomach. The "jabot," or reservoir above the anterior end of the stomach is shaped in the 7-days' chrysalis much as in the pupa of *Hamadryas io*, to be described further on, and is about 5.25 mm. long, scarcely 1 mm. broad, cylindrical, and at tip bluntly and regularly rounded; in the 9-days' pupa it is flattened, increasing regularly and considerably in size, and at the tip slightly and roundly invaginate; it reaches to the third abdominal segment, being 4.6 mm. long, and its greatest breadth 2.5 mm. Next the opening to the "jabot," the intestinal canal expands to a sort of crop, of an oval shape, scarcely longer than broad, and about 1 mm. long; this opens directly into the stomach, a cylindrical tube, tapering in front, about 8 mm. long, suddenly contracted at its posterior end. The intestine in a 7-days' chrysalis is a rather large, cylindrical tube, fully 6.5 mm. long, and 3 mm. broad, slightly tortuous, especially anteriorly; in the 9-days' chrysalis, however, considerable change has been effected, for the intestine is now 9 mm. long, and only 0.25 mm. in diameter, a little larger at the two extremities, but otherwise equal and much more tortuous; at first it is directed upward, forward and slightly to one side for a short distance, then it doubles upon itself, crosses to the opposite side, and moves upward in a tortuous manner to the colon, which it enters a little behind and to the left of its anterior extremity. The colon in the 7-days' chrysalis is a broadly oval, flattened sac, 1.5 mm. long, and 1.25 mm. broad; in the 9-days' chrysalis it is 3.5 mm. long, and only 1.5 mm. broad, and gradually passes into the broad rectum, which seems only a continuation of it.

In the middle of the thorax the salivary glands form exceedingly fine, crinkled threads, which here collect in a longitudinally disposed mass on each side of and touching the oesophagus; this mass extends over a distance of 2.5 mm. and the thread finally ends in a bulbous enlargement about 0.2 mm. in diameter.

The malpighian vessels begin to branch at a distance from their origin scarcely greater than their diameter, and the second division occurs at even a less distance beyond the first; one of the latter branches extends along the superior lateral walls of the stomach, as far as the middle of its anterior half (perhaps farther, later in life) and then returns; the other branch of the outer set passes along the inferior lateral walls of the stomach; they are all very delicate, measuring but 0.04 mm. in diameter, and after their return are strongly convoluted, enwrapping the intestine but not the colon.

Respiratory system. The branchial tubes in the posterior part of the body are small, but from the third abdominal segment forward they commence to enlarge; this is especially noticeable in the longitudinal canals, which are largest in the first abdominal segments, 0.8 mm. in diameter, and are again reduced in size in the thorax, where they are from 0.20 to 0.35 mm. in diameter.

Circulatory system. The dorsal vessel is firmly attached to the integument between the fourth and sixth abdominal segments, which is not the case anteriorly; on all the abdominal segments, behind the first, it expands laterally at the posterior limits of the segment, so as to be at least 0.5 mm. in diameter: on the first segment it broadens slightly, and in front of the expansion commences to diminish gradually and slightly in size, so that when it enters the thorax (from the abdomen) it becomes reduced to a diameter of only 0.20—0.25 mm. As soon as it enters the thorax it begins to plunge downward, until the constriction of the metathorax is passed, or during a course of about 3 mm. It then increases gradually in size again to about 0.45 mm., but instead of running directly to the head it passes in an oblique direction upward between the muscles of each side of the body, and when it has nearly traversed the thorax doubles upon its course, passing beneath the portion already mentioned, and then turns back again beneath its former course toward the head; the trebled portion extends over an area fully 5 mm. long, and no such marked mesothoracic enlargement as occurs in the imago was noticed; when it enters the head it has become reduced to a slender thread about as large as the oesophagus. The whole dorsal vessel from the head to the fourth abdominal segment (behind which it becomes much reduced and obscure) is 30 mm. long, when extended.

Nervous system. In the 7-days' chrysalis a great nervous mass is seen a little in advance of the middle of the thorax, a little larger than that of *Hamadryas;* the lateral nerves from it appear to be double at their origin, and to be inclined forward; behind this ganglion the cord is very slender, and at a distance of 4.5 mm. from the extremity of the ganglion emits a pair of slender but very distinct nerves, which are directed backward but divaricate considerably; there is no ganglionic enlargement at their origin. At a distance of a millimetre and a half behind this, where the cord enters the abdomen, it becomes and thereafter continues stouter, being enclosed in a nebulous wrapping, described by Dufour in the abdomen of the imago of other lepidoptera as a fibro-muscular, white membrane. At a further distance of 2.75 mm. we come to an exceedingly slight ganglioniform swelling, having no lateral nerves springing from it; probably this is what Dufour refers to as a white, fibrous, ellipsoidal capsule embracing the cord at this point. The last two ganglia are 1.25 mm. apart, measuring from their posterior extremities.

In front of the thoracic ganglion the cord is stout, 0.15 mm. in diameter; from the ganglion to where it divides around the oesophagus is 1.5 mm., and the forks are about 0.5 mm. long.

In a 9-days' chrysalis the cord has not yet attained its complete development, as is readily seen by its sinuous course between the thoracic enlargement and the lateral nerves, which diverge from the cord before the abdomen is reached, where, in a distance of 3.5 mm., the cord is 4.5 mm. long, making three sinuous curves in reaching this point; these nerves pass not to the legs but to the inflated longitudinal branchial canals; they originate 1.7 mm. in advance of the abdominal line, and 2.8 mm. behind the thoracic mass.

The nervous cord apparently enlarges as it reaches the abdomen, being enveloped in a thin film in which the lateral nerves run. The first abdominal ganglion emits an anterior lateral nerve, and at three-fifths the distance to the second abdominal ganglion another set appears, as well as still another pair just in front of the second ganglion, at only the distance of the breadth of the ganglion from it; an anterior lateral nerve is also thrown off from each side of the second ganglion, which is 3 mm. distant from the first, and another pair on the cord midway between the second and third ganglia which are 1.9 mm. apart; a similar anterior nerve to the third ganglion forks when it has passed a ganglion's breadth away. The last ganglion is 1.3 mm. distant from the third (measured from their centres) and emits several nerves; from the outer edges of the posterior border a pair of stout nerves run parallel to each other; from just behind the middle of the sides another pair arises, and nearer them than the posterior pair still another—all running backward; from the outer edges of the anterior border runs another pair, which forks almost at origin, one branch passing somewhat forward, the other somewhat backward.

Female generative organs. The basal stems of the ovarian tubes in the 7-days' chrysalis are 1.25 mm. long and 0.25 mm. broad; they suddenly diminish in size beyond this to about half this diameter, and then, in a distance of 4 mm., course forward and backward three times. The portion of the ovarian tubes between the oviduct and their own division is 2 mm. long and about twice the diameter of the divided tubes. Just beneath the anterior extremity of the colon, the oviduct expands into a broadly oval sac, scarcely longer than broad, about 0.65 mm. long, into which opens a canal 1.25 mm. long, which expands into a subreniform vessel, the spermatheca, 0.8 mm. long and about 0.5 mm. broad, terminating at its interior, anterior extremity in a slender curving tube about 0.12 mm. in diameter.

In the 9-days' (perhaps overlooked in the 7-days') chrysalis, the tips of the ovarian tubes are united into a single mass for a distance of 2 mm. and extend beyond the reduplicated portion, which extends over 6 mm. distance; the basal stems of these tubes before their union are 0.4 mm. in diameter and 2 mm. long, uniting on each side of and rather above the extremity of the stomach to form a single tube, also 2 mm. long and no stouter than its branches.

As the anterior extremity of the stomach is overlaid by the reservoir, so the posterior end is covered by the copulatory pouch, somewhat vase-shaped in the anterior portion, the extremity of which is inflated, largest in the middle and tapering in both directions; it is 5.25 mm. long, 1.8 mm. broad in the middle, 1.7 mm. at the anterior extremity and 1.25 mm. at the constriction; the anterior extremity reaches nearly to the alimentary reservoir, and is pretty strongly constricted before its inflation; just before its hinder extremity, which lies beneath the colon, it emits superiorly a tube, which, after some contortions, curves forward upon the alimentary reservoir for about 1.5 mm. and then expands into the subreniform, flattened, backwardly directed spermatheca, which lies upon the right side and terminates in a large tube a little longer than itself, opening into the oviduct. Into the oviduct also opens on the opposite side a much smaller similar canal, conducting to a slight pyriform enlargement (the unpaired accessory gland), bearing at its tip a delicate thread. Immediately after this the oviduct is fed from above, and just below the commencement of the rectum, by a pair of vermiform, widely divaricating, heavy tubes (the paired accessory glands), each more than a millimetre long, and continuing as a tortuous thread, entering the tube at the middle of its anterior border. The vagina is a stout tube 0.75 mm. in diameter, 1.75 mm. long. At the extremity of the body, lying against the integument and between the opening of the vagina and the oviduct, is a transverse reniform vessel, attached broadly by its base to the inferior wall of the oviduct at its very extremity; its left tip (and perhaps also its right—but this was ruptured in the specimen in which the other was seen) terminating in two little threads. I do not find notice of any such organ in a cursory examination of some of the writings of our principal entomotomists, unless the following passage from Siebold's Anatomy of the invertebrata (Amer. ed., p. 453) refers to the same: "Some Lepidoptera have, moreover, two smaller ramose glands, situated near the orifice of the vagina, which secrete, perhaps, an odorous substance that excites the copulatory act." A foot note specifies, "Melitaea, Argynnis, Zygaena, &c."

3. THE LARVA OF *POLYGONIA C-ALBUM*, OF EUROPE.

Digestive system. The stomach is more muscular than usual, being banded with longitudinal and transverse muscles made up of approximated fibres much larger than ordinary, one pair along the dorsal line larger than the others: it is 9 mm. long, while the intestine and rest of the alimentary canal posterior to it measures 3 mm., being longer than usual; the whole canal is 16.5 mm. long. The salivary glands are long and slender, thread-like tubes, at least 3.5 mm. long, imperceptibly tapering, and extending along the sides of the body in a slightly tortuous course to the middle of the third thoracic segment, where they appear to be closely connected with some of the tracheal tubes at the base of the latero-dorsal spines. The malpighian vessels take their rise from a pretty large, irregular, subpyriform sac, slightly longer than broad, having a very slender neck-like attachment at the very base of the intestine; the lateral threads reach the front of the fourth abdominal segment; the superior and inferior threads nearly as far.

Nervous system. Each of the lobes of the cephalic ganglion appears to be globular, 0.4 mm. in diameter, perhaps shortest in transverse diameter. The lateral nerves arise from the cord in front of their respective ganglia by a distance greater than the diameter of the ganglion, and between the origin of the lateral nerves and the ganglia, the nervous cord is seen to be double. The distances apart of the body-ganglia are as follows, measured from centre to centre: 1-2, 1.2 mm.; 2-3, 1.2 mm.;

3-4, 1.25 mm.; 4-5, 0.5 mm.; 5-6, 1.5 mm.; 8-9, 2 mm.

Silk vessels. They agree in appearance with those of *Hamadryas* and reach the middle of the sixth abdominal segment, where they are attached.

Male generative organs. Testes pinkish red, the median line much deepest in color, longitudinally oval, nearly four times as long as broad, filled with a whitish granular matter, and situated in the middle of the fifth abdominal segment.

4. THE LARVA OF *AGLAIS URTICAE*, OF EUROPE.

Observations on the changes in the nervous system of this species, in passing from the larval to the pupal state and during the continuance of the latter, as also some statements regarding the structure of the tracheae, will be found in Newport's papers. See also other papers referred to in the introduction.

Digestive system. The under branch of the malpighian vessels passes along the under outer surface of the stomach as far as the hinder part of the second abdominal segment; the branch which extends along the upper outer wall of the stomach appears to extend as far only as the middle of the fourth abdominal segment.

Nervous system. The last two abdominal ganglia are so closely united as to conceal their point of union, as in *Euphoeades troilus;* and in other respects they closely resemble that species.

Glandular system. The silk-vessels are of uniform size throughout, and they therefore do not present that distinction into two parts, a vessel and a conducting tube, which holds in *Danais*.

Male generative organs. The anterior thread of the testis is fully half as long as the testis itself, measuring one millimetre in length, while in *Hamadryas* no thread was found.

5. THE PUPA OF *AGLAIS URTICAE*, OF EUROPE.

Muscular system. The mesothorax is almost entirely given up to muscular bundles, the principal portion of which, for the movement of the future wings, is divisible into two sets. One of these sets is restricted to the lower part of the sides of the thorax, and its fibres are directed from the base of the wings toward the middle of the lower surface, those of the opposite sides inclining toward each other at a little more than a right angle. In the V-shaped space between them, and including all the upper domed part of the mesothorax, is the other set, running longitudinally in five superimposed layers.

Digestive system. The tortuous intestine is 9.5 mm. long.

Male generative organs. The testis is extensively clasped by the tracheal vessels of the fifth abdominal segment. It looks as if made up of layers of fibrous material, more distinguishable because alternately darker and lighter; the anterior thread is one millimetre long, or fully half as long as the diameter of the testis. The testis is perfectly crammed with spermatozoa. These appear to be coarsely striated throughout most of their mass and to be of two sorts. In one sort the length is 0.7 mm. and the breadth 0.03 mm.; the anterior extremity is rounded, commencing suddenly yet slightly to diminish in size at about 0.03 mm. from the end; while the slightly covered posterior extremity tapers gradually and regularly for a distance of about 0.06 mm. to a blunt point. The other sort are shorter, club-like filaments, 0.145 mm. long, slightly curved, with a transparent peduncle 0.045 mm. long, and about 0.01 mm. in diameter, beyond which they rapidly expand to a club-like scale, sometimes 0.05 mm. broad.

6. THE LARVA OF *HAMADRYAS IO*. OF EUROPE.

Muscular system. From the anterior end of the inner strip of longitudinal body-muscles attached to the under surface of each segment, a slender ribbon of muscular fibres runs obliquely to the posterior end of the same segment and is attached at the ventral line. Just above the spiracles on each side there appear at first to be only two slightly separated muscular bands, the third, that lying next the tracheae, being very inconspicuous. The investing muscles of the stomach are thicker than in *Danais* and arranged in a manner resembling those of *Euphoeades*.

Digestive system. At the middle of the seventh abdominal segment the alimentary canal suddenly contracts as in *Danais*, but immediately afterwards expands into a pyloric vessel and then again contracts; the stomach, when empty, is fusiform, and bears interiorly seven or eight longitudinal ridges; the intestine and colon together form less than one-fourth of the whole intestinal canal.

The salivary glands are beaded, circular, scarcely tapering tubes, 4.5 mm. long, straight, and following the sides of the oesophagus at the base.

The malpighian vessels originate in a reniform sac, one millimetre long, which sends off a branch at right angles, a very short distance beyond its tip, and at a millimetre's distance further divides into two equal branches. The under branch passes forward in a tortuous course over the same track as in *Danais*, reaching a little way beyond the ganglion of the fifth abdominal segment.

Circulatory system. The dorsal vessel is free and very slender (about the size of the nervous cord) as far as the middle of the third abdominal segment, where it is attached above to the integument, and then suddenly expands to a much larger size, which it retains for some distance, and finally, in the seventh and eighth segments, expands again to a fusiform reservoir and then tapers to its extremity; in the head and first thoracic segment it is bordered by lobes of fatty matter composed of an amorphous mass of granulated material, differing from the alae of the dorsal vessel posteriorly, in that in the latter these granulations are mingled with and form part of cords of tissue running at right or nearly right angles to the dorsal vessel; the dorsal vessel is very elastic and flexible, and when one side is pulled, even pretty forcibly, the other remains in place.

(*To be continued.*)

NEPTICULA PTELIAEELLA, N. SP.

BY VACTOR TOUSEY CHAMBERS, COVINGTON, KY.

In a recent numero of Psyche (v. 3, p. 137-147) I gave an account of the larval history of this species, the moth not then being known. Since then I have succeeded in rearing many specimens from larvae taken in Aug. 1880: all of the moths making their appearance on the same day, 28 May: and although Psyche does not publish mere descriptions of new species generally, yet as the larval history of this species so recently appeared in its pages, it is probably best to supplement it by a brief description of the imago.

The moth has an expanse of wings of about 4 mm., and is of a rich deep violet brown, strongly marked with silver, its coloration recalling that of *Antispila ampelopsiella*, Cham. The tuft covers the face nearly down to the trophi, and the eye-caps are scarcely as large as usual in this genus; the scales are not very coarse nor would I describe them as fine. (There is great difference in this respect between different species of this genus.) The head is dark brown; eye-caps white; antennal stalk yellowish, stained with silvery fuscous above; the palpi are silvery fuscous, but, like the legs, in many lights they appear sordid yellowish. The legs and tarsi are brown on their anterior surfaces and silvery fuscous on their hinder surface. Abdomen slate color with a silvery lustre. Thorax, a small spot on the base of the interior margin of the forewings, a rather wide fascia just before the middle of the wings, and a costal and opposite interior spot before the cilia, all like polished silver on a ground color of deep violet brown; the cilia white. In some specimens the legs show little of the brownish color, but this I think is due to denudation. Many of our species described as *Nepticula* belong to the allied genus *Trifurcula*, but this species is, I think, properly referable to *Nepticula*.

THE GRAPEBERRY MOTH (*EUDEMIS BOTRANA*, *S. V.*).

BY MARY ESTHER MURTFELDT, KIRKWOOD, MO.

This pretty little tortricid is very abundant this year in the environs of St. Louis, and its larvae cause all — or nearly all — of the so-called *rot* that has appeared in our vineyards this season.

It may not be generally known that the spring brood of larvae feed on the tender shoots of the common ironweed (*Vernonia noveboracensis*) which they web together for their better protection. When mature they desert these retreats and cut little flaps from the larger leaves, which, folded over and fastened at the edges, protect them during the pupa stage.

Prof. Fernald informs me that this species has also been bred from larvae webbing the leaves of the Tulip-tree (*Liriodendron*) and of *Amorpha*, but in this locality I have only found the larva in the grape and on the *Vernonia*.

PSYCHE.

CAMBRIDGE, MASS., OCT.-DEC. 1881.

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PROCEEDINGS OF SOCIETIES.

CAMBRIDGE ENTOMOLOGICAL CLUB.

(*Continued from p. 245.*)

11 FEB. 1881.—74th meeting (*continued*). Mr. W: Trelease described his observations of the manner in which a male and female *Cicada* approached each other. The male remained stationary until the female, attracted by his stridulation, flew to him and alighted in a position facing him. The male then walked past the female until the two were back to back. Mr. S: H. Scudder said that prior to the copulation of the sexes of *Argynnis atlantis*, the male follows the female half way in her rear, so that the bodies of the two overlap side by side. The female, in moving, makes a quick start forward for a few steps; then the male does the same.

Mr. Trelease recorded the capture of *Anthidium cognatum* in Maryland, near the Potomac River. This species had not hitherto been observed north of Georgia. He then gave an account of his observations on the number of times in succession that *Vespa maculata* can give a poisonous sting. He hired a negro boy to allow himself to be stung at ten cents a sting. Taking the wasp between his fingers, Mr. T. pressed her first upon the back of the boy's left hand, then upon the right arm, then upon the lower lobe of the right ear, and then upon the left ear. In each case the wasp inflicted a poisonous sting so that the wound became swollen; and as the powers of neither the wasp or the boy seemed to diminish as rapidly as the contents of the experimenter's purse, the experiment was discontinued. In Mr. T.'s opinion the sting is not stiff enough to pierce the skin of the inside of the finger tip, so that the wasp may be picked up with impunity. Mr. G: M. Dimmock said he had observed in a similar case that a second puncture with a wasp's sting did not cause so much swelling as the first. Mr. Trelease said that the sting of *Stizus* was not nearly so severe as that of a bee.

Mr. S: H. Scudder exhibited a cast of the first paleozoic insect ever found. This was found at Coalbrookdale, Eng., about 1833, and was described by Audouin as *Corydalis brongniartii*. It was studied anew by Swinton, who called it *Gryllacris*.

11 MAR. 1881.—75th meeting. Prof. J: H: Comstock exhibited drawings and photographs of drawings intended to be used in illustration of the forthcoming report of the Entomologist of the U. S. Department of agriculture, upon the insects injurious to the orange, and particularly upon the *coccidae*. He also gave an account of the work of his division, and the plans and principles on which he carried it on.

Mr. S: H. Scudder exhibited a copy of a recent work by Dr. Jousset de Bellesme on the functions of the balancer or haltere in diptera, and gave some account of the contents of the work. He also exhibited a proof sheet of one of the plates in the forthcoming numero of Edwards' Butterflies of North America, illustrating the varieties of *Satyrus alope*, and communicated the request, in behalf of Mr. Edwards, that any person having remarkable varieties of this species would send specimens immediately to Mr. Edwards, so that he might figure them. The next plate to which Mr. E. will devote his attention is that of *Satyrus nephele*.

Mr. Scudder spoke of his experiences in finding museum pests (*Anthrenus varius*) in old boxes which had not been used for many years, and had been cleaned frequently. This called out mentions of similar experiences from Dr. H. A. Hagen and others. Mr. B: P. Mann said that he had no apprehension of being unable to free any infested collection from pests. It is necessary, however, to devote frequent attention to the collections.

8 Apr. 1881. — 76th meeting. Mr. S: H. Scudder exhibited proofs of nearly twenty plates of engravings of fossil insects, prepared for one of the forthcoming volumes of Hayden's Geological and geographical survey of the territories. Nearly all the original drawings were made by Mr. J. H. Blake, and the lithographing was all done in Sinclair's establishment at Philadelphia. All but the first ten plates represented fossils from Florissant. Mr. Scudder stated some of the preliminary conclusions, in regard to the venation of the wings, to which he had arrived, as a result of his study of fossil insects.

13 May 1881.—77th meeting. Mr. S: H. Scudder exhibited plates containing figures of fossil species of *Termes*, and remarked upon the structural features of the species.

A communication was read, from the Middlesex Institute, of Malden, Mass., announcing the formation and organization of the Institute. Mr. E: P. Austin gave notice of an expedition which he was about to make in Arizona and adjacent regions, primarily on business, but collaterally with attention to the insects to be found.

Mr. S: H. Scudder called attention to a paper on the Westphalian species of *Donacia*, in the Jahresbericht der zoologischen Section des westfälischen Provinzial-Vereins für Wissenschaft and Kunst, for 1875.

14 Oct. 1881.—78th meeting. Mr. W: Trelease was elected acting secretary for the remainder of the year, in the absence of Mr. B: P. Mann.

Mr. S: H. Scudder spoke of a series of articles by himself, which was to be published in Psyche, on the anatomy of the immature stages of butterflies, mentioning some particulars of larval structure which confirm the growing belief, drawn from the study of the imago, that the swallow-tails [*papilionidae*] should be placed near the bottom of the scale in classification, near the skippers [*hesperidae*], instead of at the head, where Linnaeus placed them. Remarks by Dr. E: L. Mark led to a discussion of several structural peculiarities of lepidoptera, especially of organs found by Mr. Scudder near the anus of the female pupa of *Danais*, and not mentioned by Mr. E: Burgess in his Anatomy of *Danais archippus;* these organs recall the odoriferous organs mentioned by Burnett in his translation of Siebold's Comparative anatomy, as occurring in *Argynnis* and other genera.

A question by Mr. F: Gardiner, jr., led to remarks by Dr. E: L. Mark on the defensive organs of *Brachinus* and other insects.

Dr. E: L. Mark spoke of the value of the larvae of *Corethra* for demonstrations of the anatomy of insects, owing to their great transparency. An incidental advantage mentioned is the existence of a very extensive literature upon the subject.

Mr. S: H. Scudder read a letter from Prof. J: H: Comstock concerning an aquatic lepidopterous larva, belonging to the genus *Arzama*. This larva has been found in New York and in Florida; it lives in the petiole of the pond-lily [*Nymphaea odorata*], and is able to remain under the water for a half-hour or longer.

Mr. W: Trelease showed an undescribed *Chionaspis*, found on *Spartina stricta*, at Wood's Holl, Mass. These insects were said to thrive on plants partly submerged in salt water at every high tide, and when collected were wet with salt spray! The coccid had been referred to Prof. J: H: Comstock.

Mr. S: H. Scudder showed larvae of *Sciara*, which had been sent from Natick, Mass., by Mr. W: Edwards. They unite in some way and form a compact body twelve to fifteen decimeters long, and as large as a man's thumb. They move slowly in a snake-like manner. When an attempt is made to lift the chain it breaks, but it reunites if the ends are placed together.

Mr. S: H. Scudder showed two larvae of *Apatura* from Florida, calling attention to their relative position in hibernation, and remarking on their habits.

11 Nov. 1881. — 79th meeting. Mr. W: Trelease showed a specimen of ant-architecture from Wood's Holl. Mass. A small colony of *Crematogaster lineolata* Say, ☿, had built a tube of crumbled wood about a twig of *Andromeda ligustrina*, at a height of twelve or fifteen decimetres from the ground, enclosing a colony of larval aphides, which they defended pugnaciously. The branch being transferred to a room the ants manifested no disposition to leave their charge, occasionally going down, for a drink, to the water in which the twig was kept. They were kept for about two weeks, when all were transferred to alcohol.

Mr. W: Trelease also showed specimens of the white-grub (*Lachnosterna quercina*), from Madison, Wisc., infested with immature *Torrubia*, and remarked on the great destructiveness of the grubs about Madison during the past season.

Mr. S: H. Scudder showed a number of carboniferous fossils, among them an immature specimen of the largest fossil myriapod known, a myriapod provided with gills and showing clearly the aquatic adaptation of some of the group at that time, a greatly elongated cockroach, too imperfect for satisfactory study, and a gigantic arachnid resembling *Chelifer*.

Mr. S: H. Scudder exhibited also a plate of figures of fossil spiders from the tertiary beds of Florissant, Col., and stated the general results he had arrived at from their study. The number of species was greater than in all the stratified tertiary beds of Europe together, and they showed a general affinity to those now living in the southern United States—a *Tetragnatha* and a *Nephila* were present, besides several species of two new genera, one of *epeiridae*, the other an abnormal form of *attidae*, with four instead of two large eyes. The *epeiridae* included nearly half of the total number of species. There was indication of somewhat interesting relations with the amber fauna of Europe.

9 Dec. 1881. — 80th meeting. Dr. H. A. Hagen read a paper on amber *psocina* from Prussia. No fossil *Psocus*, save those from amber, are known. After stating the general results of his study, Dr. Hagen concluded that the amber forms gave reason to believe that before the tertiary times a great development of genera and species had occurred, but the ancestral forms had not been preserved. In the present imperfect state of our knowledge of both fossil and living representatives of the group, it did not seem wise to attempt to trace their evolution.

Remarks were made by Dr. Hagen and Mr. S: H. Scudder, on the causes which influence the imprisonment of insects in amber, and on the reasons for the absence of such groups as *odonata* and lepidoptera.

Entomological Society of London.

2 June 1880.— . . . Mr. Finzi exhibited (on behalf of Mr. Lowrey) an example of *arctia fuliginosa*, in which one antenna was congenitally absent. The president [Sir J: Lubbock] stated that he had occasionally bred ants with only one antenna, and one example with no antennae, this latter being helpless when out of the nest. — The president exhibited an Australian ant, allied to *camponotus*, remarkable for having its abdomen enormously distended (resembling that of a gravid queen termite), so that it was little else than an animated honey-bag. In this it was analogous to another (American) species forming the genus *myrmecocystus* of Wesmael.—*Entom. mo. mag.*, July 1880, v. 17, p. 48.

6 Oct. 1880.— . . . Mr. A. H. Swinton read two papers on the effects of food in producing variability in lepidoptera, more especially with regard to *vanessa urticae* and *arctia caja*. — *Entom. mo. mag.*, Dec. 1880, v. 17, p. 167.

2 Mar. 1881.— . . . Mr. [E. A.] Fitch read a detailed report from the "*Western daily mercury*" on the discovery of living Colorado-beetles in possession of a man near Plymouth, with editorial leaders on the legal proceedings taken against that individual.

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [ ], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

Corrections of errors and notices of omissions are solicited.

Aldrich, C: Value of the house wren as an insect destroyer. (Amer. nat., April 1881, v. 15, p. 318-319.)

The house wren [*troglodytes aedon*] should be encouraged to build its nest about our houses. *G: D.* (2485)

American association for the advancement of science — *Entomological club* — [*Boston* (*Mass.*) *meeting* (1880)]. Annual meeting. (Can. entom., Sept. 1880, v. 12, p. 161-174.)

Contains S: H. Scudder's "Problems in entomology" [Rec., 2181] and abstracts of other addresses. *G: D.* (2486)

[**Ants**, Notes on.] (Free religious index, 10 March 1881, v. 12, p. 440, col. 3, 10 cm.)

Notes from J: Lubbock on means of communication and other habits of ants. *G: D.* (2487)

Aquatic sphinx larva (An). (Amer. nat., Feb. 1881, v. 15, p. 151.) (Separate (General notes; entomology], from Amer. nat. Feb. 1881, p. 151.)

Brief abstract of H. A. Hagen's "On an aquatic sphinx larva" (Psyche, Sept. 1880, v. 3, p. 113) [Rec. 2502]. *G: D.* (2488)

[**Bees** on *gerardia pedicularia.*] (Bull. Torrey botanical club, Nov. 1880, v. 7, p. 113.)

Statement, on authority of the club, that *bombus*, in gathering nectar from flowers of *gerardia pedicularia*, never enter the mouth of the corolla, but perforate the corolla at its base. *W: T.* (2489)

Bell, James Thompson. How to destroy cabinet pests. (Can. entom., July [Aug.] 1877, v. 9, p. 139-140.) [Rec., 1205].

Reprint. (Ann. rept. entom. soc. Ontario, for 1877, 1877, p. 18.)

Successful use of a mixture of potassic cyanide (KCN) and sulphuric acid (H_2SO_4). [The hydrocyanic acid vapor generated by this mixture is a very dangerous poison, and should never be used except by an experienced chemist.] *G: D.* (2490)

Bennett, Alfred W. Fertilization of the bee orchis [*ophrys apifera*]. (Nature, 20 July 1871, v. 4, p. 222–223, 6 cm.)

Confirms Darwin's observations on the self-fertilization of the flowers, which had not been visited by insects. *W: T.* (2491)

[**Blatta orientalis.**] (Journ. applied sci., June 1881, v. 12, p. 92, 3 cm.)

Increased use in pharmacy. *G: D.* (2492)

[**Bombyx quercicus.**] (Journ. applied sci., May 1881, v. 12, p. 76, 5 cm.)

Notes the discovery of this silkworm in Nevada. *G: D.* (2493)

Böttner, Hermann. Der Bienenfreund. Ein einfacher leicht verständlicher Unterricht in der Bienenzucht. Durch 92 in den Text gedruckte Abbildungen erläutert. 2te verbesserte Auflage. Halle a. d. S., Otto Hendel, 1880. t.-p. cover, 8+384 p., 22×15, t 17×10.2. pap., 4 M.

A general illustrated work on apiculture. *G: D.* (2494)

Bug as an element in food (The). (Springfield [Mass.] d. republican, 21 Feb. 1879, p. 4, col. 3-4, 35 cm.)

Editorial notice of E. R. Leland's "Mites, ticks, and other acari" (Popular sci. mo., Feb. 1879, v. 14, p. 502-513) [Rec., 2521], with quotations, to which are added further notes in regard to mites in brown sugar. *G: D.* (2495)

Bunker, Robert. Hints on collecting, breeding and preserving insects. (Trans. Rochester soc. nat. sci., no. 1.) Rochester, N.Y., Sept. 1880. 12 p., 23×15, t 17.5×10.1.

Describes briefly the habits of different genera of butterflies, the construction of collecting-nets, methods of attracting insects by "sugar" and otherwise, of rearing insects from collected eggs and larvae, and of killing, pinning and preserving them; remarks on giants, dwarfs and deformities. [Defective article, containing many typographical errors.] *B: P. M.* (2496)

Caspary, Robert. Ueber die Nektarien der Stipulae von *sambucus racemosus* und *nigra*. (Bot. Zeitung, 29 Sept. 1848, v. 6, c. 681-687.)

The nectar of these glands is gathered by ants. *W: T.* (2497)

Cassino, S: Edson. The naturalists' directory. . . . 1877 [Rec., 1159].

Rev. (Entom. Nachrichten, 15 April 1878, jahrg. 4, p. 111.) *G: D.* (2498)

Cassino, S: Edson, *ed.* The naturalists' directory for 1880. Containing the names, addresses, special departments of study, etc., of the naturalists, chemists, physicists, astronomers, etc., etc. Also a list of the scientific societies, of scientific periodicals, and the titles of scientific books published in America, from July 1, 1879, to Oct. 1, 1880. Boston, Cassino, 1880. t.-p. cover, t.-p., 8 + 152 + p., 20×14, t 14.2 ×8.5. pap., $1.00.

Rev. (Amer. bookseller, 1 Jan. 1881, v. 11, p. 14.)

Crit. rev., by J: S. K[ingsley]. (Amer. nat., Jan. 1881, v. 15, p. 42-43.)

Addresses of persons, with specialties mentioned, unenumerated, arranged by states; 555 persons said to make entomology a specialty; 5 entomological societies mentioned. Advertisements; no index. *B: P. M.* (2499)

Darwin, C:, *see* HENSLOW, G:, Note on the structure of *indigofera* . . . [Rec., 2429].

Gosse, Philip H: The Canadian naturalist. A series of conversations on the natural history of Lower Canada. Lond., 1840. 12 + 372 p., 22×12, t 14.5 × 8. il.

Contains very many original observations on insects, scattered through the volume. For an index to the notes on butterflies, see PSYCHE, v. 3, p. 245-247. *S: H. S.* (2500)

Gosse, Philip H: Letters from Alabama (U. S.), chiefly relating to natural history. Lond., 1859. 12+306 p., 17×10.5, t 13.5× 7.5. il.

Contains very many original observations on insects, scattered through the volume. For an index to the notes on butterflies, see PSYCHE, v. 3, p. 245-247. *S: H. S.* (2501)

Hagen, Hermann August. On an aquatic sphinx larva. (Psyche, Sep. [15 Dec.] 1880, v. 3, p. 113.)

Abstract, entitled "An aquatic sphinx larva." (Amer. nat., Feb. 1881, v. 15, p. 151.) (Separate [General notes; entomology], from Amer. nat. Feb. 1881, p. 151.)

Aquatic habits of larva of an undescribed species of *philampelus*, feeding on floating leaves of *nymphaea:* list of the 6 described American species of *philampelus*. *B: P. M.* (2502)

Hagen, Hermann August. Beitrag zur Kenntnis des Tracheensystems der Libellen-Larven. (Zool. Anzeiger, 5 April 1880, jahrg. 3, p. 157-161.)

Crit. rev. of a part of J. A. Palmén's "Zur Morphologie des Tracheensystems" . . . [Rec., 2588]. *G: D.* (2503)

Insect locomotion. (Amer. nat., April 1881, v. 15, p. 325.)

Notice of G. Carlet's studies upon locomotion of insects and spiders. *G: D.* (2504)

Johnson, James Smith. On *hyphantria textor*. (Can. entom., Jan. 1881, v. 13, p. 18.)

Biological notes. *G: D.* (2505)

Keferstein, Adolf. Betrachtungen über die Entwickelungsgeschichte der Schmetterlinge und deren Variation. Erfurt, Carl Villaret, 1880. t.-p. cover, 116 p., 21×14.5, t 17×10.5.

Rev., by F. Katter. (Entom. Nachrichten, 1 July 1880, jahrg. 6, Lit. Rev., p. 54.)

A collection of peculiarities of the eggs, larvae, pupae and imagos of lepidoptera, with citations of the authorities on which many of the statements rest. *G: D.* (2506)

Kellicott, D: Simons. The larva of *catocala unijuga*. (Can. entom., Feb. 1881, v. 13, p. 38-39.)

Description of larva of *c. unijuga* found on *populus candicans*. *G: D.* (2507)

Kellicott, D: Simons. Observations on several species of *aegeriadae* inhabiting the vicinity of Buffalo, N. Y. (Can. entom., Jan. 1881, v. 13, p. 3-8.)

Biological notes on *aegeria tricincta*, *a. pini* (new species), *a. pictipes*, *a. acerni*, *a. pyri*, *a. tipuliformis*, *a. exitiosa* and *trochilium denudatum*. *G: D.* (2508)

K[ingsley], J: Sterling. The naturalists' directory for 1880. (Amer. nat., Jan. 1881, v. 15, p. 42-43.)

Crit. rev. of S: E. Cassino's "The naturalists' directory for 1880" . . . [Rec., 2499]. The review is not entomological. *G. D.* (2509)

Kirkpatrick, J. Honey bees killed by pollen. (Amer. nat., Apr. 1869, v. 3, p. 109, 6 cm.)

States that hive bees encumbered with pollen masses of *asclepias* are ejected from the hive by the other workers, and allowed to starve; also records the death of small flies and moths that are caught by the glands but are too small to remove the *pollinia*. *W: T.* (2510)

[**Krancher**, L.] Höchst erfreuliche Nachrichten. (Deutsch. Bienenfreund, 1 Jan. 1881, jahrg. 17, p. 3-4.)

Quotes letter (dated, Cypress, 13 Dec. 1880) from Frank Benton in regard to his (Benton's) proposed trip to India and the East Indian islands to study the varieties of bees in those regions, and, if the races are found good, to import them into America. Remarks of the editor (L. Krancher) of the *Deutsch. Bienenfr.* upon the subject. *G: D.* (2511)

Krancher, Oskar. Der Bau der Stigmen bei den Insecten. (Zool. Anzeiger, 29 Nov. 1880, jahrg. 3, p. 584-588.)

Notice. (Amer. nat., April 1881, v. 15, p. 320.)

Different forms of stigmata classified, their location, tracheal valves and their structure; stigmata of no great morphological value, but show adaptation to environment. *G: D.* (2512)

Lancelevée, T. Une chasse interessante. (Feuille des jeunes naturalistes, 1 Nov. 1880, an. 11, p. 13.)

Fleeces of wool from Australia contain large numbers of insects in good condition for collections. *G: D.* (2513)

Latzel Robert. Beitrag zur Kenntnis der Geophiliden. (Zool. Anzeiger, 1 Nov. 1880, jahrg. 3, p. 546-547.)

Notes on *himantarium* and *notiphilus*; describes a new genus, *notiphilodes* based on *notiphilus maximiliani* from Mexico. *G: D.* (2514)

LeConte, J: Lawrence. On lightning bugs. (Can. entom., Sept. 1880, v. 12, p. 174-184.)

Considerations upon those *lampyridae* and lampyrid larvae which emit light; their classification, the nature, causes, and uses of their light. *G: D.* (2515)

Leggett, W: H. Fertilization of *rhexia virginica*, L. (Bull. Torrey bot. club, Sept. 1881, v. 8, p. 102-104, 2 fig.)

Describes the structure of the flower, and its fertilization by *bombus*. Also notes the behavior of *bombus* while collecting pollen on *cassia marilandica*. *W: T.* (2516)

Leggett, W: H. Grasshoppers. (Bull. Torrey bot. club, Oct. 1874, v. 5, p. 41, 7 cm.) [Rec., 145 *d.*]

Records these insects as resorting to the flowers of *hemerocallis fulva*, L., for shelter at night, their occasional inability to escape after the flowers have closed about them, and their consequent death. *W: T.* (2517)

Leggett, W: H. Honey bee killed by *asclepias* pollen. (Amer. nat., Sept. 1869, v. 3, p. 388-389, 12 cm.)

Notes the manner in which numbers of pollen masses are removed by a bee, which finally becomes so loaded as to be unable to escape from the last flower visited. States also that hive bees on a given visit to hyacinths confine themselves to flowers of a given color. *W: T.* (2518)

Leggett, W: H. Imitation. (Bull. Torrey bot. club, Nov. 1870, v. 1, p. 43, 3 cm.)

Describes the capture of a wasp by a yellow spider that lay concealed among the flower-heads of a *solidago*. *W: T.* (2519)

Leggett, W: H. Imitation. (Bull. Torrey bot. club, Aug. 1871, v. 2, p. 32, 4 cm.)

States that the central purple flower of *daucus carota* serves as a screen for one or more similarly colored small spiders. *W: T.* (2520)

Leland, E. R. Mites, ticks and other acari. (Popular sci. mo., Feb. 1879, v. 14, p. 502-513.)

Notice, entitled "The bug as an element in food." (Springfield [Mass.] d. republican, 21 Feb. 1879, p. 4, col. 3-4, 35 cm.)

Presence of insects in food. *G: D.* (2521)

Lendenfeld, R. Ueber den Flug der Libellen. Vorläufige Mittheilung. (Zool. Anzeiger, 10 Jan. 1881, jahrg. 4, p. 23-24.)

How *libellulidae* fly. *G: D.* (2522)

[**Leucania unipuncta**.] (Springfield [Mass.] d. republican, **1880**: 8 June, p. 8, col. 2, 5 cm.; 11 June, p. 6, col. 5, 1 cm.; 12 June, p. 5, col. 3, 4 cm.; 12 June, p. 5, col. 4-5, 5 cm.; 14 June, p. 5, col. 4-5, 8 cm.; 17 June, p. 6, col. 6, 1 cm.; 18 June, p. 6, col. 2, 2 cm.; 19 June, p. 4, col. 1, 5 cm.; 21 June, p. 6, col. 1, 3 cm.; 22 June, p. 5, col. 5, 2 cm.; 22 June, p. 6, col. 5, 1 and 3 cm.; 24 June, p. 4, col. 4, 1 cm.; 24 June, p. 6, col. 6, 1 cm.; 25 June, p. 6, col. 5, 1 cm.; 26 June, p. 5, col. 3, 1 cm.; 26 June, p. 6, col. 5, 1 cm.; 28 June, p. 6, col. 5-6, 8 cm.; 28 June, p. 6, col. 6, 1 cm.; 29 June, p. 6, col. 6, 4 cm.; 30 June, p. 6, col. 5, 1 cm.; 1 July, p. 6, col. 5, 1 cm.; 7 July, p. 6, col. 5, 1 cm.; 8 July, p. 6, col. 2, 2 cm.; 8 July, p. 6, col. 6, 1 cm.; 24 July, p. 6, col. 6, 1 cm.; 3 Sept, p. 3, col. 2, 1 cm.)

Items which note the appearance of the "army worm" in parts of Nova Scotia, Me., N. H., Vt., Mass., Conn., N. Y., N. J., and Pa.; and notes upon their devastations. *G: D.* (2523)

Lichtenstein, Jules *and* Valéry **Mayet**. Étude sur le gribouri ou écrivain de la vigne, *cryptocephalus vitis* Geoffroy, aujourd'hui genre *adoxus* Kirby. Montpellier, 1879. 12 p., 22×14, t 16×9.

Rev. (Entom. Nachrichten, 15 Oct. 1879, jahrg. 5, p. 271.)

Figures and describes larva and pupa of *adoxus vitis;* habits and remedies. *G: D.* (2524)

Lichtenstein, Jules. Manuel d'entomologie à l'usage des horticulteurs du midi de la France. Extrait des Annales de la société d'horticulture et d'histoire naturelle d l'Hérault. Montpellier, 1872. t.-p. cover, 83 p., 23×14.5, t 16.5×9.

A brief general work on entomology. *G: D.* (2525)

Lockwood, S: Notes on the elm-tree leaf-beetle, *galeruca xanthomelaena*. (Amer. nat., March 1881, v. 15, p. 242-244.)

Notes on *g. xanthomelaena* and its ravages on elm [*ulmus*] in N. J.; its mode of hybernation in houses. *G: D.* (2526)

[**Locusts** as sources of chemicals.] (Psyche advertiser, Mar.–Apr. [Sept.] 1878, p. 8.)

Formic acid and an oil, calopten, can be made from *caloptenus*. Same statements are made under title "Nutzen aus Heuschrecken" (Entom. Nachrichten, 1 Nov. 1878, jahrg. 4, p. 287). *G: D.* (2527)

Lubbock, *Sir* J: On British wild flowers considered in relation to insects. With numerous illustrations. Lond., Macmillan and Co., 1875. 186 p., 18×12, t 15×8.5; 130 fig.

"Germ. tr., by A. Passow, entitled 'Blumen und Insecten in ihrer Wechselbeziehung dargestellt. Nach der 2e Auflage.' Berl., Bornträger, 1877. 8vo."

Rev., by J. B., under full title. (Journ. of botany, 1875, v. 13, n.s., v. 4, p. 157.)

Rev. of Germ. tr., by [Ernst] K[rause]. (Kosmos, June 1877, v. 1, p. 275, 18 cm.)

In this popular book—one of the "Nature series"—the author summarizes the studies of Sprengel, Müller, Darwin, Hildebrand and others on the mutual relations between flowers and insects, considering more especially the British flora. *W: T.* (2528)

Lubbock, *Sir* J: Common wild flowers considered in relation to insects. Address delivered at the Belfast meeting of the British association for the advancement of science, Aug. 1874. (Nature, 1874, v. 10: 17 Sept., p. 402-406; 24 Sept., p. 422-426.)

Describes, with the use of numerous figures, the mutual adaptations between flowers and insects, and the benefit resulting to both from the relations which are maintained between them. *W: T.* (2529)

Ludwig, Fritz. Die Befruchtung der Pflanzen durch Hülfe der Insekten und die Theorie Darwin's von der Entstehung der Arten. Inaugural-Dissertation. Bielefeld. Velhagen & Klasing, 1867. t.-p. cover, 35 p., 22×14, t 16.5×9.5.

The author shows that some flowers are adapted for constant crossing, others for occasional crossing, others for constant self-fertilization. He argues that variability and cross-fertilization are strong arguments against the Darwinian theory of the origin of species, which he believes cannot be explained in the present state of our knowledge. *W: T.* (2530)

MacLeod, Jules. Contribution à l'étude du role des insectes dans la pollinisation des fleurs hétérostyles, *primula elatior*. (Bull. de l'acad. roy. de Belgique, July 1880, s. 2. v. 50, p. 27-33.)

Abstract, with same title. (Bibliothèque universelle; Archives des sci., Oct. 1880. v. 4, p. 422-423.)

An undetermined species of *bombus*, while inserting its tongue into the flowers of *primula elatior* for nectar, transfers pollen from the long stamens to the long pistil, and from the short stamens to the short pistil, effecting legitimate unions of both sorts. *B. muscorum*, on the other hand, bites through the corolla at the level of the short stamens, and, introducing her head through the opening thus made, obtains the nectar, but in doing so merely transfers pollen from the short stamens to the short pistils, the pistils of the long-styled flowers remaining unfertilized. *W: T.* (2531)

McGann, T. Bees and flowers. (Science gossip, Feb. 1877, p. 44, 3 cm.)

States that *bombus* gathered nectar from *aconitum* and from *fuchsia* until September, when they were superseded by *apis mellifica*, which also gather nectar from *tritoma*. *W: T.* (2532)

Marshall, W. C. Fertilization by moths. (Nature, 12 Sept. 1872, v. 6, p. 393, 3 cm.)

Records the capture "on an island of less than six acres [2.4 Ha.], in the middle of Derwentwater, of 20 specimens of the common 'shark' moth (*cucullia umbratica*); of these, seven had the pollinia of the butterfly orchis (*habenaria chlorantha*) sticking to their eyes." No plants of this orchid growing on the island, the moths must have carried the pollinia from places at least a half-mile [0.8 Km.] from that where they were taken. *W: T.* (2533)

Mayet, Valéry, *see* LICHTENSTEIN, Jules *and* Valéry MAYET, Étude sur le gribouri . . . [Rec., 2524].

Michels, H. Beschreibung des Nervensystems von *oryctes* . . . [Rec., 1979].

Rev. and abstract, entitled, "Change in the nervous system of beetles during metamorphosis." (Amer. nat., Jan. 1881, v. 15, p. 58-59.) *G: D.* (2534)

Minot, C: Sedgwick. A sketch of comparative entomology. (Amer. nat., Dec. 1880. v. 14, p. 871-880, fig. 20-28.)

Change from larva to pupa, and from pupa to butterfly is really gradual, though apparently sudden; figures transverse section of a gastric coecum of *caloptenus spretus* illustrating use of longitudinal folds to increase the surface; insect tracheae derived from ectoderm. *G: D.* (2535)

Moggridge, J. Traherne. The fertilization of *fumariaceae*. (Nature, 7 May 1874, v. 10, p. 5, 15 cm.)

Describes the fertilization of *fumaria capreolata* var. *pallidiflora* by a mason-bee [*osmia*]. Also notes the visits of *apis* to *reseda phyteuma*. *W: T.* (2536)

Monks, Sarah P. Curious habit of a dragon-fly. (Amer. nat., Feb. 1881, v. 15, p. 141.)

Larva of *aeschna* throws water for defence as well as for propulsion. *G: D.* (2537)

Morris, G. K. A new leaf-cutting ant. (Amer. nat., Feb. 1881, v. 15, p. 100-102.)

Description of the nest of an ant (? *atta*.) *G: D.* (2538)

Muhr, Josef. Die Mundtheile der Insecten dargestellt auf 5 Wandtafeln. Prag, H. Dominicus, 1879. t.-p., 1 p. expl. of pl., 5 pl., in cover. 63×44, t 38×53. M. 7.32.

Figures, on a large scale, the mouth-parts of *gryllus campestris*, *carabus intricatus*, *apis mellifica*, *pieris brassicae*, *pyrrhocoris aptera* and *culex pipiens*. According to *Zool. Anzeiger*, 29 Dec. 1879, jahrg. 2, p. 657, this is the edition of 1878, with new date. *G: D.* (2539)

Muhr, Joseph. Die Mundtheile der Orthoptera, ein Beitrag zur vergleichenden Anatomie. (4ter Jahresbericht über das deutsche Staats–Realgymnasium in Prag . . . 1875-1876, p. 1-16, pl. 1-2.)

General remarks upon mouth-parts of insects; special treatment of the mouth-parts of *forficulina, blattina, mantodea* and *phasmodea;* figures whole or parts of the mouth-parts of *forficula minor, periplaneta orientalis, blatta germanica* and *mantis religiosa.* *G: D.* (2540)

Müller, Fritz. Ueber die Befruchtung der *martha* (*posoqueria?*) *fragrans.* (Bot. Zeitung, 27 Apr. 1866, v. 24, c. 129-133, pl. 6. A.)

Crit. rev., by C: Wright, entitled "Cross fertilization." (Amer. nat., Oct. 1868, v. 2, p. 437-440.)

Describes the structure of this Brazilian plant, and its very remarkable adaptations to cross-fertilization by insects. A note in *op. cit.*, 8 Mar. 1867, v. 25, c. 80, makes a slight correction to this article. *W: T.* (2541)

Müller, Fritz. Befruchtungsversuche an cipó alho, *bignonia.* (Bot. Zeitung, 25 Sept. 1868, v. 26, c. 625-629.)

States that pollination is effected by bugs, beetles, and humble-bees. The greater part of the paper consists in an account of experiments which demonstrate the self-impotence of the pollen of the species in question. *W: T.* (2542)

Müller, Fritz. Habits of ants, &c. (Nature, 17 Feb. 1876, v. 13, p. 305, 16 cm.)

States that *cecropia* trees in Brazil are protected from leaf-cutting ants by other ants that are attracted to the plant by outgrowths, rich in protoplasm, at the bases of the leaf-stalks. Living in the hollow stems, this protecting army is thus kept constantly on the tree. Describes the manner of pupation of a chalcid parasite of this ant. *W: T.* (2543)

Müller, Fritz. Über die von den Trichopterenlarven der Provinz Santa Catharina verfertigten Gehäuse. [Aus den] Archivos de museu national, vol. III, p. 99–134, p. 209–214. Rio de Janeiro, 1880. Aus dem Portugiesischen übersetzt von dem Bruder des Verfassers, Dr. Hermann Müller, in Lippstadt. (Zeitschr. f. wiss. Zool., 1880, bd. 35, p. 47–87, pl. 4–5.)

Describes and figures the larval-cases of a large number of larvae of *trichoptera;* with numerous biological notes. *G: D.* (2544)

Müller, Hermann. Fertilization of flowers by insects. 3. On the coexistence of two forms of flowers in the same species or genus: a more conspicuous one adapted to cross fertilization by insects, and a less conspicuous one adapted to self fertilization. (Nature, 25 Sept. 1873, v. 8, p. 433-435.)

Describes the two sorts of flowers in *lysimachia vulgaris, euphrasia officinalis* and *rhinanthus crista-galli*, indicating the insects which fertilize the larger flowers. *W: T.* (2545)

Müller, Hermann. Fertilization of flowers by insects. 4. On the two forms of flower of *viola tricolor*, and on their different mode of fertilization. (Nature, 20 Nov. 1873, v. 9, p. 44-46.)

Describes large and small flowered forms, the former fertilized by insects, the latter occasionally visited by insects but adapted to regular self-fertilization. The flowers are figured in eight wood-cuts. Lists of the insects taken on them are given. *W: T.* (2546)

Müller, Hermann. Fertilization of flowers by insects. 5. More conspicuous flowers adapted to cross-fertilization and less conspicuous ones adapted to self-fertilization, occurring in different species of the same genus. (Nature, 1 Jan. 1874, v. 9, p. 164-166.)

Compares some species of *malva, epilobium* and *polygonum*, which illustrate the subject in question. *W: T.* (2547)

Müller, Hermann. Fertilization of flowers by insects. 6. Different modes of self-fertilization where visits of insects are wanting. (Nature, 18 June 1874, v. 10, p. 129-130.)

Discusses the fertilization of *myosurus minima* and *myosotis versicolor;* noting the insects which sometimes fertilize them, and showing how self-fertilization is secured in default of their visits. *W: T.* (2548)

Müller, Hermann. Fertilization of flowers by insects. 7. Butterflies the most frequent visitors of alpine flowers. (Nature, 12 Nov. 1874, v. 11, p. 32-33.)

Shows the relative proportion of *apidae*, lepidoptera and other insects taken upon flowers at high altitudes. *W: T.* (2549)

Müller, Hermann. Fertilization of flowers by insects. 8. Alpine species adapted to cross-fertilization by butterflies, while the most nearly allied species which inhabit the plain or lower mountain region are adapted to cross-fertilization by bees. (Nature, 10 Dec. 1874, v. 11, p. 110-112.)

Contrasts alpine and lowland species of *daphne, primula* and *rhinanthus*, showing the changes which the flowers of the alpine species have undergone to adapt them to the lepidoptera which are their most frequent visitors. *W: T.* (2550)

Müller, Hermann. Fertilization of flowers by insects. 9. Alpine orchids adapted to cross-fertilization by butterflies. (Nature, 31 Dec. 1874, v. 11, p. 169-171.)

Shows that while only 12-15 per cent. of the Westphalian lowland or hill orchids are adapted to fertilization by butterflies, these insects are the chief fertilizers of alpine species, 60-80 per cent. of which show special modifications by which they are enabled to profit by the visits of butterflies. *W: T.* (2551)

Müller, Hermann. Fertilization of flowers by insects. 10. *Lilium martagon.* (Nature, 20 May 1875, v. 12, p. 50-51, 35 cm.)

Shows that the flowers are adapted to fertilization by diurnal lepidoptera, and shows how this is effected by *macroglossa stellatarum* in the Vosges. *W: T.* (2552)

Müller, Hermann. Fertilization of flowers by insects. 11. Adaptation of flowers to lepidoptera: *Hesperis tristis.* (Nature, 8 July 1875, v. 12, p. 190-191.)

Shows the flowers of this plant to be suited to fertilization by nocturnal moths, and records those taken upon it. *W: T.* (2553)

Müller, Hermann. Fertilization of flowers by insects. 12. Further observations on alpine flowers. (Nature, 13 Jan. 1876, v. 13, p. 210-212.)

Remarks further on the plants considered in no. 11 of this series of papers [Rec., 2553], and in addition discusses the adaptation of *rhinanthus alpinus* to fertilization by butterflies, and of *rh. alectorolophus* by *bombus* and butterflies. *W: T.* (2554)

Müller, Hermann. Fertilization of flowers by insects. 13. Additional alpine flowers adapted to cross-fertilization by lepidoptera. (Nature, 10 Feb. 1876, v. 13, p. 289-292.)

Shows the adaptation of *viola calcarata* and *lilium bulbiferum* to fertilization by butterflies, and notes their visitors, contrasting them with *v. tricolor* and *l. martagon.* *W: T.* (2555)

Müller, Hermann. Fertilization of flowers by insects. 14. Flowers fertilized by the wings of butterflies. (Nature, 22 June 1876, v. 14, p. 173-175, 4 fig.)

Shows that the flowers of a Brazilian *hedychium* are cross-fertilized in the manner indicated; records their visitors, from the observations of Fritz Müller. *W: T.* (2556)

Müller, Hermann. Fertilization of flowers by insects. 15. Alpine species of gentian. (Nature, 8 Feb. 1877, v. 15, p. 317-319.)

Shows that of alpine gentians one has nectar accessible to insects of all orders, some are adapted to fertilization by *bombus*, while many are adapted to lepidoptera. *W: T.* (2557)

Müller, Hermann. Fertilization of flowers by insects. 16. Alpine species of *gentiana* adapted to lepidoptera. (Nature, 29 Mar. 1877, v. 15, p. 473-475.)

Discusses the fertilization of several species, enumerating their visitors. Traces the probable descent of German and Swiss gentians, by aid of a sort of ancestral tree. *W: T.* (2558)

Müller, Hermann. On the fertilization of flowers by insects and on the reciprocal adaptations of both. [1.] (Nature, 3 July 1873, v. 8, p. 186-189.)

Shows how *apis* and *bombus* obtain the nectar of flowers. Figures the mouth-parts of *apis* and of three species of *bombus*. This and the succeeding articles bearing the same title are taken in large part from the author's "Die Befruchtung der Blumen . . ." [Rec., 2045]. *W: T.* (2559)

Müller, Hermann. On the fertilization of flowers by insects and on the reciprocal adaptations of both. 2. In what manner the hive- and humble-bees obtain the honey of the flowers. (Nature, 10 July 1873, v. 8, p. 205-206.)

Shows how bees obtain nectar properly and by violence. *W: T.* (2560)

Müller, Hermann. [Fertilization of flowers: literature of 1873.] (Bot. Jahresbericht . . . Just, [1874], v. 1, p. 360-378.)

As editor of this department of the annual named, Dr. Müller reviews 17 books and papers relating to pollination. *W: T.* (2561)

Müller, Hermann. [Fertilization of flowers: literature of 1874.] (Bot. Jahresbericht . . . Just, [1876], v. 2, p. 880-903.)

Reviews 18 books and papers relating to the pollination of flowers. *W: T.* (2562)

Müller, Hermann. [Fertilization of flowers: literature of 1875.] (Bot. Jahresbericht . . . Just, [1877], v. 3, p. 903-909.)

Reviews 14 books and papers on the fertilization of flowers. *W: T.* (2563)

Müller, Hermann. [Fertilization of flowers: literature of 1876.] (Bot. Jahresbericht . . . Just, [1878], v. 4, p. 935-948.)

Notices 34 books and articles concerning the fertilization of flowers, and the general relations between flowers and animals. *W: T.* (2564)

Müller, Hermann. [Fertilization of flowers: literature of 1877.] (Bot. Jahresbericht . . . Just, [1879], v. 5, p. 732-755.)

Reviews 45 papers on the mutual relations between flowers and insects, etc. *W: T.* (2565)

Müller, Hermann. [Fertilization of flowers: literature of 1878.] (Bot. Jahresbericht . . . Just, [1880-1881], v. 6, p. 303-329.)

Notices 47 papers on the pollination of flowers, etc. *W: T.* (2566)

Müller, Hermann. [Fertilization of flowers: literature of 1879-1880.] (Bot. Jahresbericht . . . Just, [1881], v. 7, p. 92-150.)

Notices 128 publications on the pollination of flowers, etc. *W: T.* (2567)

Müller, Hermann. Fertilization of the *fumariaceae.* (Nature, 16 April 1874, v. 9, p. 460-461, 23 cm.)

Discusses the changing color of certain flowers, and especially of fumitory, in its bearing upon their fertilization. *W: T.* (2568)

Müller, Hermann. The fertilization of *fumariaceae.* (Nature, 7 May 1874, v. 10, p. 5, 11 cm.)

Discusses the change in color which the flowers of a fumitory undergo, in its bearings on their insect fertilization. *W: T.* (2569)

Müller, Hermann. Ground ivy. (Nature, 26 June 1873, v. 8, p. 161-162, 11 cm.)

Shows how gyno-dioicism may have been acquired in flowers through natural selection. Records the insect visitors of *thymus serpyllum* and *nepeta glechoma.* *W: T.* (2570)

Müller, Hermann. Die Insecten als unbewusste Blumenzüchter [Rec., 1642].

Abstract, by W: Trelease, entitled "Insects as unconscious selectors of flowers." (Amer. nat., Apr. 1879, v. 13, p. 257-260.) *W: T.* (2571)

Müller, Hermann. Nectar, its nature, occurrence and uses. (Bot. Zeitung, 29 Oct. 1880, v. 38, c. 748-749, 24 cm.)

Abstract of paper by W: Trelease, with same title, in J. H. Comstock's "Report on cotton insects." [See Rec., 2475.] *W: T.* (2572)

Müller, Hermann. Probosces capable of sucking the nectar of *angraecum sesquipedale*. (Nature, 17 July 1873, v. 8, p. 223, 16 cm.)

Describes and figures the proboscis of a Brazilian sphinx 0.25 metre long;—as an indirect answer to W. A. Forbes' "Fertilization of orchids" (Nature, 12 June 1873, v. 8, p. 121) [Rec., 2400]. *W: T.* (2573)

Müller, **Hermann**. *Saxifraga umbrosa* adorned with brilliant colors by the selection of *syrphidae*. (Nature, 8 July 1880, v. 22, p. 219.)

Reprint. (Botanical gazette, Sept. 1880, v. 5, p. 93-94, 11 cm.)

Reprint, with comments. (Bull. Torrey bot. club, Sept. 1880, v. 7, p. 99-100, 15 cm.)

Attributes the beautiful variegation of these flowers to the unconscious selection of certain *syrphus* flies which serve as agents for their cross-fertilization. *W: T.* (2574)

Müller, Hermann. Die Wechselbeziehungen zwischen den Blumen und den ihre Kreuzung vermittelnden Insekten. (Aus "Encyclopädie der Naturwissenschaften. Abtheil. 1, Theil 1, 'Schenk's Handbuch der Botanik.'") Breslau, Trewendt, 1879. 112 p., 25×16.5, t 21×12; 32 fig.

Abstract, by W: Trelease, entitled "The mutual relations between flowers and the insects which serve to cross them." (Amer. nat., July 1879, v. 13, p. 451-452.)

Abstract, by F. Delpino, under title "Rapporti tra fiori e pronubi." (Rivista bot., 1879, p. 50-53.)

Abstract, by author, under same title. (Bot. Jahresbericht . . . Just, 1879, v. 7, p. 97-99.)

A popularly written exposition of the mutual relations between flowers and animals, especially insects. *W: T.* (2575)

Müller, Hermann. Weitere Beobachtungen über Befruchtung der Blumen durch Insekten. **1.** (Verhandl. des naturhist. Vereins der preuss. Rheinl. und Westfälens, 1878, jahrg. 35, folge 4, jahrg. 5, p. 279-323, pl. 6.)

Separate, with same title. Berlin, R. Friedländer & Sohn, 1879. t.-p., 59 p., 22×14, t 17.5×9.5; 1 pl., 22×17.

Ital. tr. of greater portion, with comments, by F. Delpino, entitled "Altre osservazioni intorno a piante zoidiofile." (Rivista bot., 1879, p. 53-61.)

Additional observations on the pollination of plants studied in the author's "Die Befruchtung der Blumen" [Rec., 2045], with the addition of a few not mentioned in that work. Records the visits of many insects. *W: T.* (2576)

Müller, Hermann. Weitere Beobachtungen über Befruchtung der Blumen durch Insekten. **2.** Mit zwei Tafeln. [Separat aus Verhandl. d. naturhist. Vereins d. preuss. Rheinl. u. Westfälens, jahrg. 36.] Berlin, R. Friedländer & Sohn, 1880. t.-p. cover, t.-p., p. 197-268; pl. 2-3, 22×14, t 17×9.3. pam., M. 2.50.

Notice, by Sickmann. (Entom. Nachrichten, 1880, jahrg. 6: 1 Apr., Lit. Rev., p. 36; 15 May, Lit. Rev., p. 43.)

Additions to the author's "Die Befruchtung der Blumen durch Insekten" . . . [Rec., 2045.] *G: D.* (2577)

Mundt, A. H. Notes upon climatic influences on *samia gloveri* of Utah and *s. ceanothi* of California. (Can. entom., Feb. 1881, v. 13, p. 35-37.)

Effect of differences of temperature and moisture on the larvae and pupae of the above-mentioned species. *G: D.* (2578)

N., N. Besitzt die cyprische Biene entschiedene Vorzüge? (Deutsch. Bienenfreund, 15 June 1880, jahrg. 16, p. 181.)

Answer and crit. rev., by J. Stàhala, entitled "Der Entscheidungskampf wegen der Leistungsfähigheit der cyprischen Biene. (Deutsch. Bienenfreund, 15 Jan. 1881, jahrg. 17, p. 23-28.)

Objections to Cyprian bees. *G: D.* (2579)

Note on nutgalls. (New remedies, Feb. 1881, v. 10, p. 53, 11 cm.)

Statistical and other notes on *cynips quercus-folii* and its galls on *quercus infectoria*, from Karl Scherzer's "Smyrna" . . . . *G: D.* (2580)

Olivier, Ernest. La chrysomèle des pommes de terre, *doryphora decemlineata*, mœurs, histoire, moyens de destruction. 2ème édition. Besançon, 1878. t.-p. cover, 35 p., 1 pl., 19×12, t 13×7.7.

Rev. (Nouv. et faits divers de l'Abeille, 1878, no. 18, p. 70.)

D. decemlineata, its classification, nomenclature, history of its spread in America and introduction into Europe, description and figures of its various stages, means to use against it, and its natural enemies. *G: D.* (2581)

Osborn, Herbert. Food habits of *saperda cretata*. (Amer. nat., March 1881, v. 15, p. 244.)

Mode of egg-laying, and way in which the larva feeds on apple trees. *G: D.* (2582)

Overrated ant (The). From Mark Twain's new book "A tramp abroad." (Springfield [Mass.] d. republican, 26 May 1880, p. 8, col. 3, 28 cm.)

Humorous account of the labors of ants. *G: D.* (2583)

Packard, Alpheus Spring, *jr.* Bibliography of economic entomology. (Can. entom., Feb. 1881, v. 13, p. 39.)

Preliminary notice of a proposed bibliography of economic entomology to be prepared by the United States entomological commission. Essentially the same as "[Bibliography of economic entomology]" (Amer. nat., Jan. 1881, v. 15, p. 84) [Rec., 2226]. *G: D.* (2584)

Packard, Alpheus Spring, *jr.* *Cetonia inda.* (Amer. nat., Nov. 1880, v. 14, p. 806.)

C. inda injures corn [*zea mays*] in Massachusetts. *G: D.* (2585)

Packard, Alpheus Spring, *jr.* Eggs of the tree cricket wanted. (Amer. nat., Nov. 1880, v. 14, p. 804.)

Desires eggs of *oecanthus.* *G: D.* (2586)

Packard, Alpheus Spring, *jr.* Fauna of the Luray and Newmarket caves, Virginia. (Amer. nat., March 1881, v. 15, p. 231-232.)

Notes on various insects found in these caves. *G: D.* (2587)

Palmén, Joh. Axel. Zur Morphologie des Tracheensystems. Mit 2 lithographirten Tafeln. Helsingfors, J. C. Frenckell & Sohn, 1877. t.-p. cover, 10+149 p., 23×14, t 16×9.5; 2 pl.

Crit. rev., by H. A. Hagen, entitled, "Beitrag zur Kenntnis des Tracheensystems der Libellen-Larven." (Zool. Anzeiger, 5 April 1880, jahrg. 3, p. 157-161.)

Treats of the tracheal system, of tracheal gills, of the formation of stigma in the *ephemeridae*, *perlidae*, *libellulidae*, *trichoptera* and *sialis*, and in certain species of diptera, hymenoptera, lepidoptera and coleoptera; general considerations upon closed tracheal systems and the formation of stigmata in them; the open tracheal system. *G: D.* (2588)

Plant-feeding habits of predaceous beetles. (Amer. nat., April 1881, v. 15, p. 325-327.)

Zabrus gibbus, *megilla maculata*, *coccinella novemnotata*, *brachyacantha ursina*, *hippodamia convergens*, *epilachna borealis*, *harpalus caliginosus* and species of *galerita*, *loxopeza*, *calathus*, *anisodactylus*, *amara*, *cratacanthus*, *evarthrus*, *pterostichus*, *chlaenius* and *bradycellus*, have been found to eat vegetable food. Compiled from papers of F. M. Webster, S. A. Forbes, W: Trelease, W. A. Buckhout and others. *G: D.* (2589)

Protection against flies and mosquitoes (A). (Springfield [Mass.] d. republican, 26 July 1880, p. 2, col. 6, 6 cm.)

A correspondent (in *Nature*) recommends a weak decoction of quassia chips to keep flies and mosquitoes from the face, and to keep insects out of beds. *G: D.* (2590)

Puton, A. Mœurs des *hister.* (Feuille des jeunes naturalistes, 1 Dec. 1880, an. 11, p. 30.)

Hister helluo devours larvae of *agelastica alni.* *G: D.* (2591)

Raabe,—. Die Ueberwinterung der Bienen. (Deutsch. Bienenfreund, 1881, jahrg. 17: 1 Feb., p. 34-40; 15 Feb., p. 51-57, 1 fig.)

How to keep bees healthy through the winter. *G: D.* (2592)

Raulin,—. Du sommeil de la chrysalide chez diverses espèces de *bombyx.* Lyon, 1879. t.-p. cover, 2 t.-p., p. 11-18, 26×17, t 17.5×10.4.

Paper read before the Société d'agriculture, histoire naturelle et arts utiles de Lyon, on 29 Nov. 1878. The author concludes from experiments made upon the chrysalids of *bombyx cynthia*, with electricity and by subjecting the chrysalids to various degrees of cold, that "there is a great analogy between the physiological phenomena of the life of the chrysalids and of that of the eggs of *bombyx;* the sleep and the reawakening of the chrysalids resemble very much the sleep and reawakening of the eggs. In this sense one can say that the chrysalis is to the butterfly as the egg is to the larva." *G: D.* (2593)

Reed, Edmund Baynes, *ed.*, *see* CANADIAN ENTOMOLOGIST (The).

Reichenau, Wilhelm. Zur Kenntniss der Feinde schädlicher Krautraupen. (Entom. Nachrichten, 1 Feb. 1881, jahrg. 7, p. 50-51.)

Proportion which the number of chrysalids of *pieris rapae* and *p. brassicae* bear to the number of their parasites (*ichneumon* and *pteromalus puparum*). *G: D.* (2594)

Reilly, Robert B. Let the cockroach giggle! Song and chorus. *Illustr. words and music.* New York, 1881. 5 p., 4°.

The chorus reads:

Then let the cockroach giggle in his corner on the floor,
And the red ant in the closet laugh away;
While the old daddy-long-legs in the centre parts his hair,
From childhood's home I never long can stray.

S: H. S. (2595)

Riley, C: Valentine. The Colorado beetle, with suggestions for its repression and methods of destruction. Lond., G: Routledge & Sons, 1877. 123[+adv.] p. [incl. 1 pl.], 17×10.5, t 13×7.5.

Doryphora decemlineata; its past history, its native home, rate and mode of its invasion, causes which limit its spread, how it has affected the price of potatoes, the modifications it has undergone, its natural history, its poisonous qualities, its food plants, its natural enemies, remedies, use of Paris green, alarm about the insect abroad, nomenclature, the bogus Colorado potato-beetle (*d. juncta*). *G: D.* (2596)

[**Riley**, C: Valentine.] Hybernation of the cotton-worm moth: ease with which mistakes are made. (Amer. nat., March 1881. v. 15, p. 244-245, 3 fig.) (Separate [General notes; entomology], from Amer. nat., Mar. 1881, p. 244-245, 3 fig.)

Quotes letter from I. A. Wimbish, in which the writer has sent a specimen of *leucania unipuncta* supposing it to be *aletia argillacea.* How to recognize *aletia.* Figures ovipositor and eggs of *l. unipuncta* and imagos of both species. *G: D.* (2597)

Riley, C: Valentine. Insectivorous plants. (Amer. nat., Nov. 1874, v. 8, p. 684-687) [Rec., 285].

Reprint, with figure, and same title. (Science gossip, 1874, p. 272-275, fig.)

Is in the main a résumé of the author's "On the insects more particularly associated with *sarracenia variolaris*..." (Proc. Amer. assoc. advanc. sci., 1874, v. 23, pt. 2, p. 18-25) [Rec., 576; *see also* Rec., 143*c*]. Treats of the insects captured by *sarracenia*, and of those which enter and leave the pitchers at will. *W: T.* (2598)

Riley, C: Valentine. Insectivorous plants. (Science gossip, 1874, p. 272-275, fig.)

Reprint of Riley's "Insectivorous plants" (Amer. nat., Nov. 1874, v. 8, p. 684-687) [Rec., 285, 2598], with the addition of one or more figures. *W: T.* (2599)

Riley, C: Valentine. Larval habits of bee-flies, *bombyliidae*. (Amer. nat., Feb. 1881, v. 15, p. 143-145, fig. 1-3.) (Separate [General notes; entomology], from Amer. nat. Feb. 1881, p. 143-145, fig. 1-3.)

Habits of *systoechus* and *triodites* as parasites on locusts' eggs, and notice of T. A. Chapman's "On the economy ... of *bombylius*" (Entom. m. mag., Feb. 1878), which records *bombylius major* as a parasite of *andrena labialis*. Figures larva, pupa and imago of *systoechus oreas*. *G: D.* (2600)

Rothrock, J. T. The fertilization of flowering plants. (Amer. nat., Apr. 1867, v. 1, p. 64–72.)

Describes some of the contrivances by which flowers profit by the visits of insects. Does not mention any insect visits on his own authority. *W: T.* (2601)

Rudow, ——. Eine Missbildung von *musca domestica*. (Entom. Nachrichten, 1 March 1881, jahrg. 7, p. 84.)

A fly with three wings and three halteres. *G: D.* (2602)

Saison-Dimorphismus der Schmetterlinge (Ueber den). (Entom. Nachrichten, 1875, jahrg. 1: 1 May, p. 69–75; 15 May, p. 77–78.)

Abstract of A. Weismann's "Studien zur Descendenz-Theorie. 1. ... [Rec., 2617]. *G: D.* (2603)

Saunders, W:, *ed.*, *see* CANADIAN ENTOMOLOGIST (The).

Saunders, W: Annual address of the president of the entomological society of Ontario. (Can. entom., Oct. 1880, v. 12, p. 189–197.)

Devoted to economic entomology; deals with insectivorous birds, and insects which are parasitic on injurious insects; the species on which notes are chiefly given are *pieris rapae*, its parasite (*pteromalus puparum*), *attacus luna*, *bruchus pisi*, the plum weevil [*conotrachelus nenuphar*], *monohammus confusor*, *m. scutellatus*, *epicauta pensylvanica*, the oyster-shell bark-louse [*mytilaspis pomicorticis*] found on currant [*ribes*], *clisiocampa sylvatica* and *macrodactylus subspinosus*. See W: Saunders' "Correction" (Can. entom., Dec. 1880, v. 12, p. 262-263) [Rec., 2605]. *G: D.* (2604)

Saunders, W: Correction. (Can. entom., Dec. 1880, v. 12, p. 262-263.)

Corrects a statement in regard to *epicauta pensylvanica* in his "Annual address of the president of the entomological society of Ontario" (*op. cit.*, Oct. 1880, v. 12, p. 189-197) [Rec., 2604]. *G: D.* (2605)

Saunders, W: Entomology for beginners. (Can. entom., Jan. 1881, v. 13, p. 1–2.)

Treats of *euryomia inda* and *thyreus abbotii*. *G: D.* (2606)

Saunders, W: Entomology for beginners. On two mites. (Can. entom., Nov. 1880, v. 12, p. 237-239.)

Notes on *tetranychus telarius* and *tyroglyphus siro*. *G: D.* (2607)

Schilde, Johannes. Gegen pseudodoxische Transmutationslehren, ein entomolog. Nachweis irriger Studien zur Descendenztheorie. Leipzig, Otto Wigand, 1879. t.-p. cover, 4+154 [+2] p., 23×15, t 17×10. pam., M. 2.50.

Crit. rev., by F. Katter. (Entom. Nachrichten, 15 Nov. 1879, jahrg. 5, p. 301–302.)

Reply to Katter's crit. rev., by Schilde [with note by Katter]. (Entom. Nachrichten, 1 Jan. 1880, jahrg. 6, Lit. Rev., p. 6–8.)

Crit. rev. of A. Weismann's "Studien zur Descendenz-Theorie. 1. ... [Rec., 2617]. *G: D.* (2608)

Schwarz, Eugene Amandus. Biological note on *euplectrus comstockii* Howard. (Amer. nat., Jan. 1881, v. 15, p. 61–63.) (Separate [General notes; entomology], from Amer. nat., Jan. 1881, p. 61-63.)

Separate. [Phil., 1881]. p. 61–63, t 17.7 ×11.2.

Habits of *e. comstockii*, which is parasitic on larva of *aletia argillacea*. *G: D.* (2609)

Silkworm raising in Russia. (Journ. applied sci., March 1881, v. 12, p. 43, 7 cm.)

Statistical. *G: D.* (2610)

Spaulding, Justin. The bee's tongue, and glands connected with it. (Amer. nat., Feb. 1881, v. 15, p. 113–119, 5 fig.)

Figures and describes a gland in the head and thorax of *apis mellifica*, and the mouth parts of the same insect. *G: D.* (2611)

[**Spider-bite.**] (New England homestead, 3 July 1880, p. 3, col. 6, 1 cm.)

Records a fatal spider-bite. *G: D.* (2612)

Trelease, W: The fertilization of alpine flowers. (Bull. Torrey bot. club. Feb. 1881. v. 8, p. 13-14.)

Review of H. Müller's "Alpenblumen. . ." [Rec., 2175]. *W: T.* (2613)

Trelease, W: The mutual relations between flowers and the insects which serve to cross them. (Amer. nat., July 1879, v. 13, p. 451-452.)

Abstract of H: Müller's "Die Wechselbeziehungen zwischen den Blumen und den ihre Kreuzung vermittelnden Insekten [Rec., 2575]. *W: T.* (2614)

Trelease, W: Plant-feeding ground-beetles. (Amer. entom., Oct. 1880, v. 3, n. s., v. 1, p. 251, 8 cm.)

Finds large numbers of the carabid, *harpalus caliginosus*, feeding on the green fruit of *ambrosia artemisiaefolia.* *W: T.* (2615)

Weale, J. P. Mansel. Some observations on the fertilization of *disa macrantha.* (Journ. Linn. soc., Bot., 23 Nov. 1870, v. 13, p. 45-47.)

Believes the flowers adapted to fertilization by diurnal and nocturnal insects, but has not proved this by direct observation. *W: T.* (2616)

Weismann, August. Studien zur Descendenz-Theorie. 1. Ueber den Saison-Dimorphismus der Schmetterlinge. Mit 2 Farbendrucktafeln. [Separat aus Annali del Museo civico di storia naturale di Genova, 1874, v. 6.] Leipzig, W. Engelmann, 1875. t.-p. cover, 4+95 p., 2 col. pl., 26×17, t 18×10. pam., M. 4.

Abstract, entitled, "Ueber den Saison-Dimorphismus der Schmetterlinge." (Entom. Nachrichten, 1875, jahrg. 1: 1 May, p. 69-75; 15 May, p. 77-78.)

Notice. (Entom. Nachrichten, 1 Apr. 1877, jahrg. 3, p. 59.)

Crit. rev. (J. Schilde's "Gegen pseudodoxische Transmutationslehren" . . . [Rec. 2608].)

Engl. tr., by R. Meldola, with prefatory notice by C: Darwin, entitled "Studies in the theory of descent. Part 1. On the seasonal dimorphism of butterflies." With original communications by W: H: Edwards. Lond., Sampson Low, 1880. 8vo., with 2 col. pl. 8 sh.—[Record compiled from notices in Naturae novitates, March 1880, p. 51; Amer. nat., June 1880, v. 14, p. 468; and Zool. Anzeiger, 23 Aug. 1880, jahrg. 3, p. 410.]

Discusses the meaning, origin, and causes of seasonal dimorphism, and the relation of seasonal dimorphism to climatic varieties and to alternation of generation. The plates illustrate forms of *vanessa levana*, *pieris napi*, *papilio ajax*, *lycaena agestis*, *polyommatus phlaeas* and *pararga egeria.* *G: D.* (2617)

What the birds eat. (Springfield [Mass.] d. republican, 13 Aug. 1880, p. 3, col. 1, 25 cm.)

Abstract of a paper read at a meeting of the Ontario agricultural commission by "William E. Saunders, the well-known Canadian ornithologist." Abstract consists mostly of notes on the kinds of insects eaten by different birds. *G: D.* (2618)

White, F. Buchanan. Winter fertilization by agency of insects. (Journ. of botany, 1872, v. 10, n.s., v. 1, p. 48, 8 cm.)

Criticises certain statements in W. E. Hart's "Winter fertilization" (Journ. of botany, 1872, v. 10, n.s., v. 1, p. 25-26) [Rec., 2426], in regard to the abundance of insects on flowers in winter. *W: T.* (2619)

Wilson, A. Stephen. On the association of an inconspicuous corolla with proterogynous dichogamy in insect-fertilized flowers. (Rept. British assoc. advanc. sci., 1878, p. 564-567.)

Shows that the inconspicuous proterogynous flowers of *scrophularia* are fertilized by wasps, which visit them for their nectar. From numerous observations he concludes that as a rule these insects begin with the uppermost flower, and work downward, instead of starting with the lowest and working upward as bees do. Since a part of their food consists of living prey, likely to elude them in many cases, the writer believes their powers of perception to be more acute than those of bees; hence they should find flowers so inconspicuous as to be overlooked by bees, and as the latter, from their order of visiting the flowers, would effect close fertilization within a given plant in the case of proterogynous species, instead of crossing the flowers of different plants, he concludes that it is advantageous to many proterogynous plants to have inconspicuous flowers, which would be found only by the wasps upon which they rely for their pollination. *W: T.* (2620)

Wilson, A. Stephen. Some mechanical arrangements subserving cross-fertilization of plants by insects. (Rept. British assoc. advanc. sci., 1878, p. 568, 5 cm.)

Shows the use of floral peculiarities of *vinca*, *pinguicula* and *digitalis.* Does not record any insect visits. *W: T.* (2621)

Wright, C: Cross fertilization. (Amer. nat., Oct. 1868, v. 2, p. 437-440.)

Describes structure of flowers of *posoqueria*, by which cross-fertilization by the aid of insects with long proboscis is secured and close-fertilization prevented. Criticises Fritz Müller's studies in his "Ueber die Befruchtung der *martha* (*posoqueria?*) *fragrans*" (Bot. Zeitung, 27 Apr. 1866, v. 24, c. 129-133) [Rec., 2541], on a Brazilian species of *posoqueria.* *W: T.* (2622)

Yeoman, D. S. [Cork linings for insect cases.] (Bull. Brooklyn entom. soc., 1878-1879, [v. 1], p. 8, 12, 24, 32, 40, 51, 60, 68, 76, 84, 92.)

Advertisement. *B: P. M.* (2623)

Young, H. W. Fertilization of *gerardia flava*, L. (Bulletin Torrey bot. club, Sept. 1873, v. 4, p. 41, 5 cm.)

Describes the actions of a hive-bee [*apis mellifica*] while collecting pollen. *W: T.* (2624)

Zoological notes. (Amer. nat., Oct. 1880, v. 14, p. 739–740.)

Includes statement by W. S. Ball, that swarms of *apis mellifica* destroyed nearly half his grapes; notices of descriptions of the stridulating organs of *arachnida*, and of descriptions, by Keyserling, of new species of *arachnida* from the U. S. and from S. A. *B: P. M.* (2625)

ENTOMOLOGICAL ITEMS.

Dr. C. V. Riley was reappointed Entomologist of the United States Department of Agriculture, 6 July 1881, and entered upon his duties 1 Aug. 1881.

Captain Holden, who has recently removed to Cincinnati from Marietta, Ohio, has been an enthusiastic collector of spiders ever since his college days. In the pursuit of this fancy he has collected nearly 25,000 specimens, embracing 4000 species, from all parts of the world. They are arranged in glass bottles, with labels giving name, collector and locality. California furnished 5000 specimens, and New England as many more. One species is represented by 108 specimens, from all parts of the United States, showing how much effect environment has in modifying form. The collection is supplemented by a full and complete catalogue of the literature of the subject, comprising about 70,000 references on 10,000 cards. This valuable contribution to the study of this little-known branch of natural history he hopes to complete and publish at an early day.—*Bost. d. advert.*, 3 Aug. 1881, v. 138, no. 27, p. 4.

Mr. J. W. Freese, of Cambridge, Mass., communicates to us the following:—

I thinking to drive away a large harvestman (*Phalangium*) by pressing the extremity of one of its legs gently with the edge of my pocket-knife, it, to my surprise, instead of running away, placed the injured part in its mouth and began to moisten it with a fluid secretion, behaving much as a child does with a wounded finger. I repeated the pressure on three or four different legs, and afterward experimented with another spider, always with the same result.

At another time I drove one of these spiders from place to place by gently touching it. Finally it took a position on a horizontal leaf, its long legs projecting beyond the edge of the leaf. I touched these extremities as before, whereupon it began to move its body rapidly up and down, seemingly thinking thus to frighten away its supposed enemy.

Habits of *bombylius*. The December number of the "*American entomologist*" gives further details about the preying of the larva of *bombylius* on locust-eggs. The species of the fly was ascertained by breeding, nearly at the same time, by Mr. Lemmon in California, and by the able editor of the *American entomologist*, Mr. C. V. Riley. Two genera were obtained by Mr. Riley: *systoechus*, a genus also represented in Europe, and occurring principally in dry plains; and *triodites* (O. S., Western dipt.); belonging to the group *lomatina*. It must be borne in mind, however, that the larvae of *bombylius* (in the narrower sense) live in the cells of different bees (*andrena*, *colletes*, *halictus*), as has been ascertained by the direct observations of MacLeay (Ann. nat. hist., 1838), Morelet (Bull. soc. entom. France, 1845, p. xxiv), Schmidt Goebel (Stettiner ent. Zeit., 1876, p. 392), and T. A. Chapman (Entom. mo. mag., 1878, v. 14, p. 196). What remains to be ascertained now, are the early stages of those larvae, which, as Mr. Riley very acutely remarks (*l. c.* p. 282), very probably are "much more active than in the later stages and of a somewhat different structure." This results from the fact that the fly performs the act of oviposition in the open air, that is, some distance from the underground nest of the bee; this act was closely observed by Dr. Chapman; but we have also earlier observations, the earliest being that of Gilbert White (Nat. hist. of Selborne): "The female (he says) seems to lay its eggs as it poises on its wings, by striking its tail on the ground and against the grass that stands in its way, in a quick manner, for several times together." A similar observation was made by Frauenfeld on the oviposition of *lomatia* (Verh. Z.-B. Ges., 1864, p. 688). The statements of Zetterstedt (Ins. Lapp., p. 520) and Zeller (Isis, 1840, p. 25,) on the oviposition of *anthrax* differ in the fact that both observers saw the fly *insert* the end of the abdomen in the soil.—C: R. Osten Sacken in *Entom. mo. mag.*, Feb. 1881, v. 17, p. 206-207.

A NEW entomological society, without definite place of meeting, is proposed in France.

AN ENTOMOLOGICAL periodical, the *Wiener entomologische Zeitung*, will be commenced in January 1882 at Vienna, Austria. Its price will be eight marks a year.

MR. B: PICKMAN MANN was appointed Assistant Entomologist of the United States Department of Agriculture, 23 July 1881, and entered upon his duties 1 Sept. 1881.

W. W. FOWLER states, in the *Entom. mo. mag.*, June 1881, v. 18, p. 18-19, that a specimen of *rhagium inquisitor*, on which he experimented, supported by the clinch of its jaws a suspended weight 547 times the weight of itself.

MR. AUGUSTUS R. GROTE has sold his fine collection of North American lepidoptera. for five thousand dollars, the British Museum of London, Eng., being the purchaser. Thus, by the neglect of home institutions to secure this collection, replete with typical specimens, it has been lost permanently to the country where it belonged.

A WELL-KNOWN resident in Quebec is about to establish an apiary in the city on a very extensive scale. He has sent to Ceylon to obtain a special species of bee recently discovered in that island by Mr. Benton, the American apiarist. It is stated that Mr. Jones, of Beeton, Ontario, sold 37,000 lbs. [16,783 Kilos.] of honey from his apiary during last year.—*Colonies and India*, 10 Dec. 1881, p. 4.

THE FOLLOWING paragraph was crowded out of Dr. H. A. Hagen's article on *psocina*, on p. 220 of the current volume of PSYCHE:—

I am not prepared to give any satisfactory explanation of the use of the pterostigma-hook. It seems doubtless that it will serve for some purpose, but I think not for copulatory purposes, as it occurs in both sexes. It seems to be more developed in the genera which jump easily, and perhaps it may serve as a point of support for the intended motion of jumping. The pterostigma is apparently a blood sinus, serving as regulator of the blood circulation.

SOCIETY MEETINGS.

THE REGULAR Meetings of the Cambridge Entomological Club will be held at 7.45 p.m., on the days following:—

14 Oct. 1881.
11 Nov. "
9 Dec. "
13 Jan. 1882.
10 Feb. "
10 Mar. 1882.
14 Apr. "
12 May "
9 June "

B: PICKMAN MANN, *Secretary*.

THE REGULAR meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following:—

26 Oct. 1881.
23 Nov. "
28 Dec. "
25 Jan. 1882.
22 Feb. 1882.
22 Mar. "
26 Apr. "
24 May "

B: PICKMAN MANN, *Secretary*.

THE REGULAR meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following:—

14 Oct. 1881.
11 Nov. "
9 Dec. "
13 Jan. 1882.
10 Feb. "
10 Mar. 1882.
14 Apr. "
12 May "
9 June "

JAMES H. RIDINGS, *Recorder*.

THE SEMI-ANNUAL meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following:—

12 Dec. 1881.
12 June 1882.

JAMES H. RIDINGS, *Rec. Sec'y*.

THE REGULAR monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following:—

6 Sept. 1881.
4 Oct. "
1 Nov. "
6 Dec. "
3 Jan. 1882.
7 Feb. "
7 Mar. "
4 Apr. "

G: H. BOWLES, *Secretary*.

PRIZE ESSAYS.

DUE 15 OCT. 1882.—Life-histories of *Sclerostoma syngamus* and of *Strongilus pergracilis*. See PSYCHE, v. 3, p. 59.

ADVERTISEMENTS should reach the editors by the 10th of the month preceding the one in which they are to appear.

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J. HENRY COMSTOCK,
Department of Entomology,
The Cornell University,
Ithaca, N.Y.

No. 87-89 was issued 7 March, 1882.

PSYCHE,

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

[Established in 1874.]

EDITED BY

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January 1882.

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Cambridge, Mass., U. S. A.: Published by George Dimmock.

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S. H. SCUDDER,
Cambridge, Mass.

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PSYCHE.

FRAGMENTS OF THE COARSER ANATOMY OF DIURNAL LEPIDOPTERA.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

6. THE LARVA OF *HAMADRYAS IO*, OF EUROPE.

(*Continued from p. 275.*)

Nervous system. The cephalic lobes are vertically subpyriform, the apex downward. The third and fourth body-ganglia are almost as near each other as the third is to the origin of the nerves which spring from the cord in advance of the third ganglion, and the two ribbons which connect them are a very little parted.

Glandular system. Each of the silk-vessels is formed of an initial thread, 0.05 mm. in diameter, which is about one-seventh of the entire length, and a cylindrical tube, of four times the size of the thread; this terminates abruptly in a pointed tip, from which a delicate thread trails, and this thread is attached to the under part of the sides of the front of the intestine; the whole has a slightly wavy course, running at first near its mate on the under side of the body, as far as the second abdominal segment; then, turning abruptly and a little upward to above the middle of the body, it continues its former direction.

Male generative organs. The testes are situated in the middle of the dorsum of the fifth abdominal segment, as in *Danais;* they have only a slight rosy tinge across the middle, are 1.5 mm. long by half that width, and are subreniform in shape.

Female generative organs. The ovaries in the female are situated in the same place as the testes in the male, and consist of a pair of long obovate sacs, 2 mm. long and about 0.5 mm. broad, bluntly rounded at each end, vertically disposed, approximated, but with the lower end curved outward; they are white, and each consists of a bundle of similar tubes.

Rudiments of wings. Each of the wing-pads in the full-grown larva is formed of a pellucid, compressed, rounded, nearly hemispherical sac, fully 2 mm. long and a little longer than broad, abundantly permeated by white branching threads which do not seem to extend into the very base of the wing-pads; they are situated, base downward and convexity outward, just above and scarcely in advance of the base of the tracheae of the third thoracic segment, and at a corresponding position on the second segment; the membrane is slightly opaque and granulated; the permeating vessels are composed of bunches of numerous, minute and perfectly equal threads, varying in length and in number; they appear to be hollow and are 0.0025 mm. in diameter. A figure will be found in my work on Butterflies, already cited, p. 95.

7. THE PUPA OF *HAMADRYAS IO*, OF EUROPE.

Muscular system. In general the muscles of the abdomen seem to be situated much as in the larva, but are more compact and almost or altogether longitudinal, the oblique muscles disappearing. Those of the under surface of the abdomen consist, on each side of the body, of a ribbon, one millimetre broad, composed of two contiguous strips, the outer slightly the broader, running next the integument through the entire length of the abdomen, the inner edge at one millimetre's distance from the nervous cord.

Digestive system. The oesophagus is a slender, thread-like tube, less than 0.1 mm. in diameter; as it enters the abdomen it is at once directed upward and suddenly expands into a small bulbous muscular crop, the upper part of which opens into the reservoir, a subfusiform blind sac, broadly rounded at tip, 1.5 mm. in breadth and 5 mm. long, reaching the extremity of the fourth abdominal segment; immediately on the apical contraction of the crop, the stomach arises; this is at once many times broader than the crop, and remains nearly of this size, to the tip of the fourth abdominal segment (or where the reservoir ends); from this point on it is only half its former diameter and extends as a straight tube to the middle of the fifth abdominal segment. On each side, at the base, the stomach bears some rounded lobes, nearly as large as the crop, and besides these, arranged in a row down each side of the median line, it is profusely covered with small pea-like pockets. The intestine is tortuous, of considerable length, 0.15–0.18 mm. in diameter, and ends in the colon, a bladder-like sac, pyriform in shape and about 0.8 mm. long, containing a whitish substance: this opens into the rectum, a broad and straight tube, 1.5 mm. long and 0.25 mm. broad.

The salivary glands are composed of threads about 35 mm. long, and of a uniform size throughout; they first run straight beside the slender oesophagus, until near the middle of the mesothorax, when they become very strongly crinkled, forming by their convolutions a fusiform mass, 3.25 mm. long and 0.5 mm. broad, continuing in the same course to the middle of the metathorax.

The malpighian vessels arise at the extremity of the smaller part of the stomach, without the intervention of any basal sac, three branches arising together at the a very short distance from the base of their common stem and parting from it at right angles.

Respiratory system. The tracheae seem to be much as in the larva, only greatly reduced in size, very delicate, not at all opaque, and not divided into two sorts; the lateral longitudinal canal of the abdomen appears to be larger than any of the other vessels.

Circulatory system. The dorsal vessel is a slender, equal canal, terminating abruptly behind at the tip of the fourth abdominal segment, lying next the integument of the future imago and about 0.15 mm. in diameter in the abdomen; as it enters the thorax from behind it plunges downward to just above the oesophagus in advance of the crop, then passes rapidly upward again to the integument, which it follows to the middle of the mesothorax, diminished to half its former size, so as to appear a mere thread, and then, casting free again, passes forward as in the larva, reaching the oesophagus again in the prothorax, where it appears to be attached to something, which was not made out; beyond this point it was not traced.

Nervous system. Between the cephalic and thoracic ganglia the nervous cord is moderately broad, flattened and double; the thoracic ganglion is situated in the front part of the mesothorax; it is oval and evidently composed of two unequal, anterior and posterior, elements, for slightly in front of the middle it is pierced by a vertical passage of considerable size, and the portion in front of it has a slight, independent tumidity; the whole is a little more than 1.5 mm. long and less than half as broad, tapering posteriorly; from near the middle it emits lateral nerves, which pass toward the wings, and just before the hinder end a rather prominent nerve, which runs backward, parallel to the main cord and nearly as large as it, half way to the abdomen, evidently feeding the legs; besides these there is another similar pair, also running backward but divaricating a little, which originates from the widest part of the posterior portion. The cord itself is rather slender, and runs without enlarging until it reaches the abdomen, when it *appears* gradually to thicken and form a pseudoganglion of an elongate, fusiform shape, nearly 1.5 mm. long and terminating just before the first abdominal ganglion; this appearance, however, is produced by the fact that throughout the abdomen the cord is overlaid by an investment mainly pellucid, but not pellucid enough to allow the true cord to be seen, excepting from beneath; this investment does not cover the ganglia to an equal extent, but only as a film; so that the abdominal development of the nervous system is an exceedingly delicate cord, expanding at four different points into lenticular, disk-like ganglia of a small size, but many times exceeding the cord in diameter, the whole enwrapped in a semi-pellucid investment which makes it appear of nearly uniform diameter, excepting in front of the first true abdominal ganglion, where the investment becomes swollen and less pellucid, resembling a greatly elongated ganglion. The abdominal ganglia are 2.25 mm. apart; the first, which is scarcely broader than the cord, and noticeable mainly by its whitish color, is situated near the end of the second segment; the second at the beginning of the fourth; the third at the beginning of the fifth, and the last in the middle of the sixth segment; the last is larger than the others and emits four delicate posterior nerves; each of the abdominal ganglia is also provided with lateral nerves, similar to, but more delicate than, those of the larva.

In Newport's observations on the changes in the nervous cord of *Aglais urticae*,* he shows a more considerable change between forty-eight and fifty-eight hours than perhaps between any others of the stages he has drawn and described, which are successively (after the pupal state is assumed) 1, 13, 18, 24, 36, 48, and 58 hours. According to his account the second and third (original) ganglia at this period "approach and coalesce, and the double ganglion thus formed is only separated from the larger thoracic mass, composed of the fourth and fifth ganglia, and part of the sixth, by very short but much enlarged cords." As the figures given by him do not in themselves show how this amalgamation of the second and third ganglia is effected, I examined the nervous cord of the present species, *Hamadryas io*, 48, 51 and 55 hours after pupation, with the following results: The pupa of 48 hour's age differs from that of *Aglais urticae* only in the separation of the fourth ganglion from the united fifth and sixth; very short and broad ribbons connected them, but they were unmistakably separated by half the width of the fourth ganglion; while the third and fourth ganglia were separated by about the diameter of the latter ganglion. At 51 hours the condition was more as represented by Newport at 48 hours in *A. urticae*, the fourth, fifth and sixth ganglia being completely amalgamated into a single long ovate mass, while the third, though clearly distinct from the mass behind it, was separated from it by only less than half its own diameter, very short, stout ribbons uniting the two; it was also of the same size as at 48 hours, and the second ganglion, instead of travelling toward the third, as Newport asserts, retained very nearly or quite its own place, but was reduced in size, being gradually absorbed in place by the cord. This absorption was entirely effected at 55 hours, as also was the complete amalgamation of the third ganglion with the mass behind it. The second ganglion then is not amalgamated with the third, but disappears in place—a point quite in keeping with the lessening importance, but continued integrity, of the prothorax generally.

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*Phil. trans., 1834, p. 412–416, pl. 15–16.

Male generative organs. The testes form a globular mass 1.5 mm. in diameter.

(*To be continued on p. 307.*)

XYLOCOPA PERFORATING A COROLLA-TUBE.

BY B: PICKMAN MANN, WASHINGTON, D. C.

In October 1881 I noticed a *Xylocopa* perforating the corolla-tube of a salver-shaped flower, somewhat resembling that of a *Petunia*. The bee alighted on the five-lobed spreading top of the flower, which, as the flowers grew, was situated almost perpendicularly to the horizon, and immediately crawled over the edge, between the lobes, so as to reach the outside of the tube, which was somewhat fluted. Applying its sharp and wedge-shaped maxillae to the grooved surface of the tube, it split this open, three or four millimetres from the base, and continued the split to the base, where the nectar was situated. It then sucked out the nectar quickly, and proceeded to another flower, upon which the operation was repeated.

DEFENSIVE MIMICRY IN *PHALANGIDAE.*

BY GEORGE DIMMOCK, CAMBRIDGE, MASS.

While in Switzerland, in September 1880, I noticed a peculiar kind of defensive mimicry on the part of an undetermined species of *phalangidae*, which I have nowhere seen recorded. In approaching a rocky ledge on the road between St. Gingolph and Novel, near the south side of Lake Geneva, my attention was attracted by what I at first supposed to be a large number of small webs with large spiders in them, but which I found, on nearing the ledge, to be a great number of *phalangidae*, or "harvest-men." On coming near the place where they were, each of them began a rather rapid dorso-ventral motion of the body, swinging it backward and forward on their legs. As the rock on which they rested was nearly perpendicular, and their eight outspread, long, and slender legs rested on the projections of the irregular rocky surface, allowing their bodies to swing in the cavities between these projections, each of them resembled very closely, viewed from a short distance, a small geometric web containing a spider, for, as I have often observed, some species of spiders, when disturbed, swing their web rapidly back and forth, while clinging at its centre. The motion of the body, in the species of *phalangidae* that I observed, was of an impulsive, jerking nature, like the motion of the spiders just mentioned, when similarly disturbed. At each sudden movement of my hand a large part of the *phalangidae*, with which the rock was dotted to the number of thousands, would recommence the motion described above, but none of them ran away until they were touched, seeming to trust in the efficacy of their mode of imitative defense.

Can it be that the spiders which cause the before-mentioned swinging of their web when disturbed are more ill-tasting than *phalangidae* themselves,* and that the *phalangidae*, by imitation, avoid being eaten by birds? Or is it, on the contrary, the spiders which, for their own protection, imitate the *phalangidae?* That the motion described above originated with the spider and later served the *phalangidae* for protection seems to me more probable, for the spider has, to all appearances, another and a more natural purpose in shaking his web. As a sailor on deck shakes and yanks his ropes to see if they are firmly fastened and free from encumbrances, so the spider shakes his web from his central resting place to determine if each fastening is in proper order, or if an insect has tangled itself in any part of his web. The *phalangidae* would easily deceive birds by this motion, which, otherwise, for them, seems to have no explainable purpose.

Although I had often seen single specimens of *phalangidae* going though the same motions on horizontal surfaces, even while they were walking, it was left to this great multitude of specimens, hanging on a jagged ledge, to suggest, by actually deceiving me at first sight, the probable object of this strange motion.

Paris, France, 3 Dec. 1881.

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* Many species of *phalangidae* pour out a secretion when disturbed, which is sufficiently disagreeable, in smell and taste, to us; but, as tastes and distastes in man and birds do not always agree, this secretion may not be a protection from the attacks of certain birds.

PSYCHE.

CAMBRIDGE, MASS., JAN. 1882.

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LOAN LIBRARIES.

THE need which every student feels of access to books of reference can so seldom be met by the purchase of a complete library, that the student is obliged either to forego the use of many needed books or to obtain such as loans from their possessors.

While great liberality is usually shown by book-owners in granting loans to deserving applicants, the lack of general information as to who are the owners of particular books prevents the student from being able to request their loan, and delicacy forbids a frequent repetition of such requests.

Access to a loan library organized for the supply of books of the character indicated would undoubtedly be welcomed by a large number of students, who would willingly pay a small fee for the use of the books. Such a library, however, would fail of its usefulness if it could not afford to grant the loan of its books for a small fee, and it could not, at any rate, depend upon fees for its support.

Its first requisite, the obtaining of the books, would necessitate some sort of expenditure, or the coöperation of authors in the presentation of their individual works.

Another requisite, the preparation and publication of a catalog of the books to be loaned, would also entail expense, for while the preparation of the catalog might be secured by gratuitous labor, the same would not be the case with its publication.

A last requisite and one the most difficult to fulfil, the care of the sending and receiving of books loaned, would involve an expenditure of time and labor for which the receipt of the slight fee charged for loans would be a quite inadequate compensation.

So far as these three requisites were fulfilled, the establishment of such a loan library as is contemplated would be a success; without this fulfilment, the desired end seems unattainable. The entomologists of this country have it in their power to decide how far such a plan of a library shall be carried out.

The Cambridge Entomological Club decided in February 1875, in connection with its other bibliographical undertakings, to offer the loan of books from its library generally to all the members of the Club and subscribers to PSYCHE, the distribution and return of the books to be effected through the mails. For this purpose it secured, by gratuitous labor, the preparation of a catalog of its possessions, which, however, from lack of funds, it has been unable to publish; the same circumstance obliged it to rely entirely upon donations and exchanges for the increase of its library. Generous donations, principally of so-called "separates," and numerous exchanges for PSYCHE have been received, and the few contributions of money to the Permanent Publication Fund have tended to enrich the library, so far as they have rendered possible the continued publication of PSYCHE, upon which the receipt of exchanges depends. The want of a catalog, the inability to purchase the numerous needed works which will not be presented, and the lack of means to employ assistance in the distribution and recovery of loans, have hindered the realization of the full benefits which may result from this undertaking.

B: P. M.

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon a published. The date of publication, given in brackets [ ], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

A colon after initial designates the most common given name, as: A: Augustus; B: Benjamin; C: Charles; D: David; E: Edward; F: Frederic; G: George; H: Henry; I: Isaac; J: John; K: Karl; L: Louis; M: Mark; N: Nicholas; O: Otto; P: Peter; R: Richard; S: Samuel; T: Thomas; W: William. The initials at the end of each record, or note, are those of the recorder.

Corrections of errors and notices of omissions are solicited.

Applegarth, J: Manna and honey-dew. (Proc. Cal. acad. sci., 3 Mar. 1873, v. 5, p. 42-43.) [Rec., 540 *a*.]

Both manna and honey-dew appear in the fall, the former rarely, the latter regularly. Honey-bees [*apis mellifica*] collect both, which they store in separate cells. Neither are supposed to be caused by insects. *W: T.* (2626)

B., J. On British wild flowers considered in relation to insects. (Journ. of bot., 1875, v. 13, n. s., v. 4, p. 157.)

Rev. of J: Lubbock's work of same title [Rec., 2528]. *W: T.* (2627)

Balfour, T: Alexander Goldie. Account of some experiments on *dionaea muscipula*, Venus' fly-trap. (Trans. bot. soc., Edinburgh, 10 June, 8 July 1875, v. 12, p. 334-369.)

Record of a series of experiments on the carnivorous habits of the species mentioned. Believes that the secreting glands of *dionaea* and *drosera* serve by their color, etc., to attract prey (p. 351). Notes the behavior of released insects (p. 342). States, on the authority of Prof. Dewar, that the acid of the secretion is formic acid. *W: T.* (2628)

Bennett, Alfred W. The influence of insect-agency on the distribution of plants. (Journ. of botany, 1872, v. 10, n. s., v. 1, p. 334-335.)

Calls attention to the field for observation afforded by the relative distribution of plants and insects, and translates a portion of F. Hildebrand's "Ueber die Wechselbeziehungen in der Verbreitung von Pflanzen und Thieren" (Bot. Zeitung, Nov. 1869, v. 27, c. 792-794, 809-813) [Rec., 2647], as showing the work being done on the continent, in this direction. *W: T.* (2629)

Brenchley, T. A. A. Bees as fertilizing agents. (Gard. chronicle, 31 Jan. 1880, n. s., v. 13, p. 149, 25 cm.)

States that bees are profitably employed in early houses for effecting pollination in the peach. *W: T.* (2630)

Brown, Robert. Notes on some recent researches regarding dichogamy and other allied subjects. (Trans. bot. soc., Edinburgh, Apr. 1873, v. 11, p. 497-499.)

An account of a few of the more interesting hitherto published observations. Mentions the fertilization of *clerodendron thomsonae* by insects, that of *yucca* by *pronuba yuccasella;* denies that bees ever perforate flowers unless too large to enter them; and remarks on anemophilous flowers, and on terminology. *W: T.* (2631)

Burton, F. M. Insects and artificial flowers. (Nature, 27 Dec. 1877, v. 17, p. 162-163, 12 cm.)

States that *macroglossa stellatarum* has been seen to try to obtain nectar from artificial flowers on a lady's bonnet. Describes the strange actions of a *sphinx atropos* flying in the smoke of a steamer. *W: T.* (2632)

Cook, Albert J:, *see* Packard, A. S., *jr.*, Moths entrapped by an asclepiad plant ... [Rec., 1671].

Darwin, C:, *see* Packard, A. S., *jr.*, Moths entrapped by an asclepiad plant ... [Rec., 1671].

Darwin, C: Fertilization of vincas. (Gard. chronicle, 15 June 1861, p. 552, 11 cm.)

Describes the structure of the flower of *v. major*, and shows how it might be fertilized by moths. Insects are said never to visit the flowers in England. *W: T.* (2633)

Darwin, C: Nectar-secreting organs of plants. (Gard. chronicle, 21 July 1855, p. 487, 10 cm.)

Records the visits of *apis* to the stipular glands of *vicia sativa*, in sunshine. *W: T.* (2634)

Darwin, C: On the two forms or dimorphic condition in the species of *primula* ... [Rec., 2373].

Notice [by D. Oliver?], entitled "On dimorphism in *primula*." (Nat. hist. rev., Jan. 1862, v. 1, no. 5, p. 118, 8 cm.)

Rev. [by D. Oliver?], under title of article. (Nat. hist. rev., July 1862, v. 1, no. 7, p. 235-243.) *W: T.* (2635)

Darwin, C: On the various contrivances by which British and foreign orchids are fertilized . . . [Rec., 2378].

Rev. [by D. Oliver?], under full title. (Nat. hist. rev., Oct. 1862, v. 1, no. 8, p. 371-376.) *W: T.* (2636)

Delpino, Federico. Alcuni appunti di geografia botanica a proposito delle tabelle fitogeografiche del Prof. Hoffmann. [Estratto dal fasc. 3° del Bollettino della società geografica italiana]. Firenze, Sept. 1869. 45 p., 22×14, t 16×9.5.

Abstract, by F. Hildebrand, entitled "Ueber die Wechselbeziehungen in der Verbreitung von Pflanzen und Thieren." (Bot. Zeitung, 1869, v. 27: 19 Nov., c. 792-794; 26 Nov., c. 809-813.)

Engl. tr. of a portion of abstract, by A. W. Bennett, entitled "The influence of insect agency on the distribution of plants." (Journ. of botany, 1872, v. 10, n. s., v. 1, p. 334-335.)

Shows, among other things, that certain plants are so dependent upon certain insects and other animals for pollination that their distribution is necessarily limited by that of the insects in question. The presence of some such specialized plants in high latitudes is made use of as a reason for believing the occurrence of their particular groups of insects. *W: T.* (2637)

Delpino, Federico. Sull' opera "La distribuzione dei sessi nelle piante e la legge che osta alla perennità della fecondazione consanguinea" . . . Note critiche. (Atti della soc. ital. di sci. nat. [Milano], 1867, v. 10, p. 271-303.)

Separate, Milano, 1867. 34 p., 22×15, t 16×10.

Rev. of F. Hildebrand's "Die Geschlechter-Vertheilung bei den Pflanzen" . . . [Rec., 2436]. *W: T.* (2638)

Delpino, Federico. Relazione sull' apparecchio della fecondazione nelle asclepiadee, aggiuntevi alcune considerazioni sulle cause finali e sulla teoria di Carlo Darwin intorno all' origine delle specie. [Estratto dalla Gazzetta medica di Torino, 1865. Torino, 1865.] 24 p., 22×13, t 15.5×8.5.

The influence of insects is noted, and a partial literature of the subject given, beside details of the floral structure of *physianthus*, *periploca*, *gomphocarpa*, etc. *W: T.* (2639)

Delpino, Federico. Rivista botanica dell' anno 1878 [Estratto dall' Annuario scientifico italiano. Anno 15: 1878.] Milano, Fratelli Treves, 1879. 148 p., 19×13, t 16×9.

Part 3, Biologia vegetale (p. 18-36). Reviews 4 papers on insectivorous plants; the papers of Francis Darwin and Ferd. Cohn on protoplasmic [?] protrusions from the leaf hairs of *dipsacus* and the annulus of *amanita*, etc. (possibly connected with the absorption of organic matter); and four papers and a large number of notes on the fertilization of plants, in part through the agency of insects. *W: T.* (2640)

Delpino, Federico. Ulteriori osservazioni sulla dicogamia . . . Parte 1a [Rec., 2391].

Germ. tr. of greater part, by F. Hildebrand, entitled "F. Delpino's Weitere Beobachtungen über die Dichogamie im Pflanzenreich, mit Zusätzen und Illustrationen." (Bot. Zeitung, 1870: 16 Sept., c. 585-594; 23 Sept., c. 601-609; 30 Sept., c. 617-625; 7 Oct., c. 633-641; 14 Oct., c. 649-659; 21 Oct., c. 665-675, pl. 10.) *W: T.* (2641)

Delpino, Federico. Ulteriori osservazioni sulla dicogamia nel regno vegetale. Parte 2a. Fascicolo 2a. [Dagli Atti soc. ital. sci. nat. (Milano), 1874, v. 16: Jan., p. 151-160; July, p. 161-349; 1875, v. 17: Jan., p. 266-336; Mar., p. 337-407. Seduta del 28 Dicembre 1873.] Milano, Giuseppe Bernardoni, 1870 [corrected in copies distributed by the author to 1873-1874]. 351 p., 22×16, t 16×10.

Treats of zoidiophilous flowers, or those adapted to pollination by aid of animals; discussing the odors, colors, pollen and nectar of flowers as means of attracting to them insects and other animals, and showing how the latter effect cross-fertilization between the flowers. *W: T.* (2642)

Duchartre, P. Floraison et fécondation de l'*agave potatorum*, Zuccar. (Bull. soc. bot. de France, 27 Dec. 1861, v. 8, p. 629-630.)

Fertilization effected by flies. *W: T.* (2643)

Engelmann, G: Notes on the genus *yucca*. (Trans. acad. sci. St. Louis, 1873, v. 3, p. 17-54.)

States (p. 28) that the flowers are pollinated by aid of *pronuba yuccasella*. *W: T.* (2644)

Ernst, A. Jottings from a botanical note book. (Journ. of botany, 1870, v. 8, p. 372-376.)

Fertilization of *cattleya mossiae* (p. 372). A species of *euglossa* was found to bear the pollinia on the upper part of the thorax. *W: T.* (2645)

Grieve, P: Bees as fertilizing agents. (Gard. chronicle, 15 Feb. 1879, n. s., v. 11, p. 204, 26 cm.)

Does not believe in the introduction of bees into peach houses, as fertilization is well secured without their aid. *W: T.* (2646)

Hildebrand, Friedrich. Ueber die Wechselbeziehungen in der Verbreitung von Pflanzen und Thieren. (Bot. Zeitung, 1869, v. 27: 19 Nov., c. 792-794; 26 Nov., c. 809-813.)

Partial Engl. tr., by A. W. Bennett, entitled "The influence of insect-agency on the distribution of plants." (Journ. of botany, 1872, v. 10, n. s., v. 1, p. 334-335.)

Abstract of F. Delpino's "Alcuni appunti di geografia botanica ... [Rec., 0079], showing among other things how the distribution of certain plants may be limited by that of the insects and other animals upon which they depend for their pollination. *W: T.* (2647)

ENTOMOLOGICAL ITEMS.

Dr. John Lawrence LeConte has been elected one of the eight honorary members of the Deutsche Entomologische Gesellschaft, of Berlin.

Count Georges Vandalin Mneszech, the possessor of the largest private collection of coleoptera in the world and one extremely rich in superb specimens, died at Paris, 17 Nov. 1881, aged 58.

M. Constant Van den Branden, 69 rue de la Madeleine, Brussels, will publish, commencing in 1882, a Revue coléoptérologique, in which all new coleoptera will be published.

The entomological conferences of the Société royale linnéenne de Bruxelles, for the winter period of 1881-1882, will take place 15 Jan. and 12 Feb. 1882, and will be conducted by Monsieur A. Preudhomme de Borre.

If any American entomologist will send Mr. G. H. Verrall, Sussex Lodge, Newmarket, Cambridgeshire, England, one hundred or more species of North American *anthomyidae*, named or unnamed, Mr. Verrall will return a similar number of carefully named European species.

In the General German Patent Exhibition, at Frankfort-on-the-Main, Dr. Lucas von Heyden of Bockenheim, author of "Die Käfer von Nassau und Frankfurt" (1877), exhibits four boxes of injurious and one box of beneficial insects, and three boxes of *cynipidae* with their galls. Carl Gustav Scheffer, Postsekretär at Bockenheim, exhibits six boxes of lepidoptera. Both the above-mentioned exhibitors receive silver medals. G. W. Winter, of the firm of Werner and Winter, lithographers in Frankfort, receives a bronze medal for the exhibition of their finely executed plates of oak-galls and gall-wasps, (Plates 10-12 of vol. 35 of the Zeitschrift für wissenchaftliche Zoologie). C. Becker, teacher in Jüterbog, exhibits his adhesive preparation, which he terms "Brumala Leim," used for catching noxious insects.

SOCIETY MEETINGS.

The regular Meetings of the Cambridge Entomological Club will be held at 7.45 p.m., on the days following:—

14 Oct. 1881.
11 Nov. "
9 Dec. "
13 Jan. 1882.
10 Feb. "
10 Mar. 1882.
14 Apr. "
12 May "
9 June "

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following: —

26 Oct. 1881.
23 Nov. "
28 Dec. "
25 Jan. 1882.
22 Feb. 1882.
22 Mar. "
26 Apr. "
24 May "

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following:—

14 Oct. 1881.
11 Nov. "
9 Dec. "
13 Jan. 1882.
10 Feb. "
10 Mar. 1882.
14 Apr. "
12 May "
9 June "

James H. Ridings, *Recorder.*

The semi-annual meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following:—

12 Dec. 1881.
12 June 1882.

James H. Ridings, *Rec. Sec'y.*

The regular monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following:—

6 Sept. 1881.
4 Oct. "
1 Nov. "
6 Dec. "
3 Jan. 1882.
7 Feb. "
7 Mar. "
4 Apr. "

G: H. Bowles, *Secretary.*

PRIZE ESSAYS.

Due 15 Oct. 1882.—Life-histories of *Sclerostoma syngamus* and of *Strongilus pergracilis.* See Psyche, v. 3, p. 59.

ADVERTISEMENTS should reach the editors by the 10th of the month preceding the one in which they are to appear.

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No. 1. THE ENTOMOLOGICAL WRITINGS OF JOHN L. LECONTE. Compiled by Samuel Henshaw. Edited by George Dimmock. Nov. 1878. 11 p. t 19 × 12.5. Price, 30 cents; on 5 × 12.5 title-slips, $1.25.

No. 2. THE ENTOMOLOGICAL WRITINGS OF GEORGE H. HORN. Compiled by Samuel Henshaw. Edited by George Dimmock. Jan. 1879. 6 p. t 19 × 12.5. Price, 20 cents; on 5 × 12.5 title-slips, 50 cents.

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J. HENRY COMSTOCK,
Department of Entomology,
The Cornell University,
Ithaca, N.Y.

No. 90-92 was issued 7 Apr. 1882.

PSYCHE,

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

[Established in 1874.]

EDITED BY

G: Dimmock, *Cambridge, Mass.;* B: Pickman Mann, *Washington, D. C.;*
Albert J: Cook, *Lansing, Mich.;* Clifford Chase Eaton, *Cambridge,*
Mass.; Francis Huntington Snow, *Lawrence, Kansas;*

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Frank G: Schaupp, S: Hubbard Scudder, Roland Thaxter,
W: Trelease, H: Ward Turner, Joseph Martin Wilson.

Vol. 3. No. 94.

February 1882.

H. Hagen

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Cambridge, Mass., U. S. A.: Published by George Dimmock.

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Department of Agriculture,
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The undersigned desires, either by exchange or otherwise, Galls from all parts of the United States. He is especially interested in those made by *Lepidoptera*, *Coleoptera*, *Homoptera* and *Diptera*. Correspondence in reference to Gall growths, or other vegetable abnormities, is invited.

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S. H. SCUDDER,
Cambridge, Mass.

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FRAGMENTS OF THE COARSER ANATOMY OF DIURNAL LEPIDOPTERA.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

(*Continued from p. 298.*)

8. THE LARVA OF *CALLOPHRYS RUBI*, OF EUROPE.

Muscular system. The ventral muscular band on each side of the median line is treble, each division of about the same width as the others.

Digestive system. The oesophagus enters the stomach with no marked crop, the canal only enlarging slightly to 0.2 mm. diameter just in advance of the stomach, at the end of the second thoracic segment; the stomach is shorter than usual, occupying only one-half the length of the entire canal and ending abruptly at the end of the fourth abdominal segment. It is furnished with longitudinal and transverse muscular fibres, the bands along the middle of the dorsum several in number and more distinct than the others. The colon is much slenderer than usual, and about as long as the intestine.

The salivary glands are large, broadly tortuous tubes, their extremities attached near the middle of the thorax to the dorsal vessel.

The malpighian vessels originate in a long and slender, slightly tapering, subcylindrical sac, 0.65 mm. long, lying along the side of the intestine, but attached only by the broader end; the basal tube arises from the opposite extremity, and branches at a distance from the base of the tube of less than half the length of the sac; the lateral branches are not very closely approximated to the stomach, somewhat irregularly directed, and run as far as the front of the abdomen; the inferior branches extend about the same distance.

Circulatory system. The dorsal vessel is a comparatively large and equal tube, running distinctly as far as the end of the third abdominal segment; at the point where the salivary glands are attached to it, it becomes suddenly, though only slightly, enlarged, and gradually tapers beyond to nearly its former size.

Nervous system. The cephalic lobes are entirely distinct from each other, but in juxtaposition; each is nearly globular, but a little ovate, about 0.28 mm. long, and as high as broad. The suboesophageal and thoracic ganglia are as broad as long and of nearly the breadth of one of the cephalic lobes, but in the abdomen the ganglia grow slenderer in passing backward, so that at last they are hardly broader than the cord, and scarcely to be distinguished from it by anything more than their greater opacity and depth. The fourth and fifth body-ganglia are scarcely nearer together than the first and second, the fourth lying midway between the third and the sixth;

the third and fourth are slightly more than one millimetre apart, and separated by a slightly greater distance than any two of the abdominal ganglia; the angle of the cords between the third and fourth body-segments is much nearer the latter than in *Danais;* the last two ganglia are so closely united as to appear as one long ganglion, and they are not quite so far removed from the tenth ganglion as that is from the ninth. In at least the abdominal segments, the lateral nerves are thrown off from the cord at a distance from the ganglia equal to the width of the cord.

Glandular system. The silk vessels pass as slender, broadly curving, but not tortuous, thread-like tubes beside the intestinal canal for some distance, when they curve inward so as to meet beneath the stomach and run side by side, expanding rapidly and greatly to a cylindrical tube 0.3 mm. in diameter in the front half, about half that in the posterior portion as far as the middle of the second abdominal segment; here each diminishes rapidly in size, suddenly turns back upon itself and then, again resuming its former direction, ends in a delicate thread.

Female generative organs. The ovaries, situated in the hinder half of the fifth abdominal segment, are 0.4 mm. long, oblong ovate in shape, and of a white color.

Rudiments of wings. The wing-pads of the mature larva are nearly circular, flattened disks, a little more than a millimetre in diameter, directed backward, those of opposite sides turned a little toward each other, the metathoracic overlapping the nearer edge of the mesothoracic, and originating upon the dorsum, so near the median line that the inner edges of those on one side meet the corresponding parts of those on the other, resembling in their disposition the appearance of the wings in the pupae of *ephemeridae*, and having the very opposite position to that which they will finally assume in their own pupal stage. What is still more to be remarked is that they originate very far from the tracheal trunks, and I did not see that tracheal tubes of any sort passed to them. Traces only of vessels can be seen in their interior, but no such definite arrangement of branching tubes as was noticed in *Hamadryas;* these did not seem to run to the base of the wing-pad.

9. LARVA OF *EURYMUS PHILODICE*, OF N. AMERICA.

Muscular system. A set of nearly parallel, but slightly converging bands runs from beneath the insertion of the longitudinal ventral muscular ribbons to the ventral line, terminating at the middle of the anterior half of the succeeding segment. As to the dorsal muscles, the three longitudinal strips found on each side of the dorsal line are not continuous from segment to segment; the inner band of each segment broadens posteriorly to cover the base of the inner two of the succeeding segment; the middle band is continuous with the outer of the succeeding segment, and the outer stops altogether at the end of the segment; so that each line of muscles is oblique and extends over three segments, being inner on one, middle on the next, and outer on the third; but a portion of the inner remains inner throughout.

Digestive system. The salivary glands are 4 mm. long, flat and simple, bent abruptly outward beyond the middle, tapering slightly and regularly to a bluntly rounded tip.

The malpighian vessels originate in an oval gland or sac, 0.45 mm. long and 0.2 mm. broad, a short distance beyond which the under branch is thrown off and immediately afterward the two others. The under branch passes forward in a straight and not a tortuous course, and is proportionally about as long as in *Danais;* the upper branch extends forward for a distance of 3.75 mm.; the lateral to the point where the silk vessels bend, 7 mm. from its origin.

Nervous system. The cephalic lobes are globular. The cords connecting the second and third body-ganglia run together for nearly one-quarter the distance from the second backward, then diverge considerably, and again converging, enter the third ganglion at a perceptible distance apart; nearly the same is repeated between the first and second ganglia, but they diverge nearly from their origin; between the first body-ganglion and the suboesophageal ganglion the cords are parallel, but separate, and a little parted in the middle. The third ganglion lies in the middle of its segment, the fourth at the anterior edge of its segment, and only 0.75 mm. from the third; the fifth in the middle of the anterior half of its segment; the eleventh ganglion is considerably longer than broad, and the pair of posterior, backwardly directed, diverging nerves is larger than any of the others, and may be looked upon as the continuation of the connecting cords between the other ganglia.

Glandular system. The basal thread of the silk vessels is straight and not tortuous; the basal half of the stouter vessel is flattened; it extends backward as far as the third abdominal segment and then turns abruptly, with a slight forward curve, to the upper side of the body, where it continues in a straight line as far, apparently, as the end of the sixth abdominal segment. The length of the initial thread or duct is 3.25 mm.; of the portion of the ribbon or vessel upon the under surface 4 mm.; of that upon the upper surface 5.25 mm.

(*To be continued on p. 319.*)

COLOR OF THE LIGHT EMITTED BY INSECTS.

BY HENRY WARD TURNER, ITHACA, N. Y.

Some specimens of *Pyrophorus noctilucus* Linn., from the West Indies, that were brought to the Academy of natural sciences, at Philadelphia, gave out a very bright-green light from the two dorsal prothoracic spots, and also from the ventral surface near the base of the abdomen. Gosse (Ann. and mag. nat. hist., 1848, s. 2, v. 1, p. 200) says they give out a rich yellow-green light when flying and a green light when in captivity. *Photuris pensylvanica* gives out (sometimes at least) a very decided green light, and *Photinus pyralis* a yellow light from the ventral surface of the two or three last segments of the abdomen.

UNUSUAL CARE OF ANTS FOR APHIDES.

BY WILLIAM TRELEASE, CAMBRIDGE, MASS.

While collecting leaf-fungi on *Andromeda ligustrina*, in a sphagnum swamp at Wood's Holl, Mass., in the early part of September 1881, my attention was attracted by a small, rough mass, apparently of dried sphagnum, surrounding one of the twigs, at a distance of about a metre and a half above the ground. Curious to know how it had reached that unusual place, and what it really was, I went to it, and on closer examination found it to be a shelter erected by a colony of about a dozen worker ants over a numerous herd of small wingless brown aphides, which feed on the sap of this plant.

The twig on which the nest was placed had a diameter of about 3 mm., branched once at the top, and again at about 8 mm. from the bottom of the nest; between these branchlets a single leaf was given off. The nest was 3 cm. long, 1.3 cm. broad at the largest part, near the middle, tapering somewhat toward each end, where it was quite abruptly rounded off, running down the stem in a thin, solid layer for a very short distance. The wall, which had an average thickness of about 0.5 mm., also ran out in the same way, where the branchlets passed through. These decurrent portions formed the only support of the structure, which thus enclosed a capacious chamber surrounding the twig. On the inner surface, so far as seen, the wall was carefully smoothed off; the outer surface was quite irregular and rough. A small round opening existed at each end. That at the top was 3 mm. in diameter; the lower one was very minute, having a diameter of less than 1 mm. As I have said, the nest at first sight appeared to consist of dry bog-moss; a microscopic examination, however, showed the material to be chiefly small fragments of wood — evidently obtained from an old log lying at the foot of the shrub — with small quantities of the leaf-fragments of mosses and phaenogams, the whole apparently glued together by the saliva of the ants.

At first, neither ants nor aphides were visible, but on jarring the plant slightly, I saw the head of an ant protruded from the larger entrance, the antennae of another appearing simultaneously at the smaller. With the point of a penknife I now enlarged the latter opening, upon which several ants rushed out furiously, and two or three swarmed upon my finger which was in contact with the twig, trying to bite and sting it. The ant at the upper opening also came out, followed by one or two others, but these apparently failed to locate the disturbance, and soon reëntered the nest, as did those from below which had not touched my finger. Those upon my finger were not allowed to return to the nest, and the excitement was of short duration. Through the enlarged opening, which was from time to time curiously examined by some of the ants, I could see the aphides, crowded quite closely, receiving the caresses of their protectors, and, as usual, rewarding them with an abundance of honey-dew.

Thinking to watch them a little more, I removed the branch bearing the colony to my room, and placed it in a vase of water which was kept standing in a shallow dish filled with water. While I was carrying them home, the ants at first seemed considerably disturbed by the motion, and quite frequently came out singly or in groups of two or three, ran about, exploring the leaves and smaller twigs, and then commonly returned to the nest and reentered it as if satisfied. Occasionally one reached my hand and then showed the same fury manifested on the first disturbance, but care was taken to prevent the return of these, and the others soon ceased to notice the unusual motion. After they were safely placed in my room, the cessation of the motion produced much the same excitement as its commencement; but, like the first, this did not last long. For a short time the ants seemed restless in their new quarters, and scouts occasionally explored the twigs and leaves, sometimes going on the vase and as far as to the water in which it stood; but so far as could be seen, these were all content to return. Rarely one would go to the water as if to drink, and then return to the nest; and I am positive that some individuals never left the nest. In this way I kept them for about two weeks, in which time the leaves had partially dried, and, their food being less abundant, some of the aphides left the shelter and moved to better parts of the branch, but they still obtained enough food to produce a considerable quantity of honey-dew, and were followed by some of the ants, whose attentions were constant. Once in a while I would find one of the ants or aphides drowned in the water below, but it always appeared that it had fallen from the branch, and had not been drowned in attempting to leave the colony. Finally the remainder were put in alcohol. The ants proved to be workers of *Crematogaster lineolata* Say; not having winged individuals, I did not attempt to identify the aphides. Both, with the nest, have been placed in the biological collection of the Museum of Comparative Zoology at Cambridge, Mass.

The architecture of ants, in a number of forms, is matter of every-day observation, their nests and covered ways often being seen. That they frequently take their wards, the aphides and coccids, into their nests is sufficiently well known, whether these nests are in hollow plants (*Cecropia*), beneath stones, or in the ground; but this is the first case that has come under my observation in which a species has erected a shelter over aphides in a place not commonly chosen for its nesting. In structure and composition, the nest I have described is not unlike those formed by the same species upon fallen logs and in similar situations. Here, however, from their entire behavior, I am led to believe that they had taken up their residence at a considerable distance from the ground, and, obtaining food and drink from their herd, remained constantly upon the plant, seldom leaving the immediate vicinity of the nest.

PSYCHE.

CAMBRIDGE, MASS., FEB. 1882.

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Works on subjects not related to entomology will not be reviewed in PSYCHE.

For rates of subscription and of advertising, see advertising columns.

JOSEPH DUNCAN PUTNAM.

Born 18 Oct. 1855, in Jacksonville, Illinois.
Died 10 Dec. 1881, in Davenport, Iowa.

Mr. Putnam became well known, during the few years of his life, for the extent and thoroughness of his work. In his early life he was brought in contact with persons of scientific tastes, whom he accompanied in many of their rambles and travels. As happens with many other rising naturalists, his ardor manifested itself at first in making collections in many directions, gradually becoming concentrated, until it culminated in the choice of entomology as a special study. He was the eldest child, and was educated at home till he attained the age of ten years; he then attended the public schools of Davenport until seventeen. He was one of the earliest members of the Davenport academy of natural sciences, which was founded when he was but twelve years old. Perhaps to no other single mind did the academy become so much indebted as to him. He labored indefatigably for it, losing sight of his own interests in his zeal. He was elected recording secretary, 28 April 1871, before he had reached the age of 16, and retained this office until January 1875, when ill-health forced him to resign. He became a member of the publishing committee in November 1875, and chairman of the same in January 1877. Meanwhile, in the spring of 1876, he began the publication of the proceedings of the academy, which he carried into their third volume before his death. In November 1876 he was elected corresponding secretary, and during the following years conducted a regular correspondence with nearly five hundred scientific societies of different countries, acquiring for this purpose some acquaintance with several foreign languages. At the time of his death he had been for nearly a year the president of the academy, continuing to act as corresponding secretary in the absence of that officer, and attending, at the same time, to the professional duties, in connection with his father's business as a lawyer, by which he earned a livelihood. For the better performance of his duties as author, editor and publisher, he made himself proficient in the arts of printing, wood-engraving, and etching on copper. During the last two years he devoted his spare time to a study of the *galeodidae*, and, during a visit to the east, in 1880, made full abstracts of over 185 writings, leaving but five works on the subject, of which he knew, of which neither an edition nor translation was seen. The bibliography will be published, as he intended, in PSYCHE.

From the age of 18 until the time of his death at 26, he struggled against the inroads of consumption of the lungs, with a determination and courage which could not fail to inspire admiration. I first met him, some years ago, upon one of his visits to scientific institutions in Massachusetts, when he could not walk more than one or two blocks in the city without resting to recover his nearly exhausted breath. After his death, his left lung was found to be completely solidified.

He was a careful and accurate original observer, and, it is needless to say, in view of the work he accomplished, a diligent one. He was exceedingly modest, and never spoke in praise of himself or his work. *B: P. M.*

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Authors and societies are requested to forward their works to the editors as soon a published. The date of publication, given in brackets [ ], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

Corrections of errors and notices of omissions are solicited.

NECROLOGY FOR 1879.

Additional to Rec., 1501-1518, 1555 and 2125-2142.

Boisduval, Jean Baptiste Alphonse Déchauffoir. [Biog. sketch.] (Annuaire entom. . . . Fauvel, 1880, p. 118-119.)

Oberthur, C: Notice nécrologique sur le docteur Boisduval. (Annal. soc. entom. France, 1880, s. 5, v. 10, trim. 2, p. 129-138.)

[See Rec., 2127.] *G: D.* (2648)

Chapuis, Félicien. [Biog. sketch.] (Annuaire entom. . . . Fauvel, 1880, p. 119-120.)

[*See* Rec., 1503.] *G: D.* (2649)

Chenu, Jean C: [Biog. note.] (Amer. nat., Feb. 1880, v. 14, p. 151.)

[*See* Rec., 1505 and 2129.] *G: D.* (2650)

Fritsch, K: [Biog. note.] (Entom. Nachrichten, 15 Jan. 1880, jahrg. 6, p. 18.)

[*See* Rec., 2132.] *G: D.* (2651)

Goureau, Claude C: [Biog. sketch.] (Annuaire entom. . . . Fauvel, 1880, p. 120-121.)

See Rec., 2133.] *G: D.* (2652)

Mocquerys, Simon. [Biog. sketch.] (Annuaire entom. . . . Fauvel, 1880, p. 121-122.)

Coleopterist; b. in Troyes, France, in 1792; d. in Rouen, France, 12 Feb. 1879. *G: D.* (2653)

NECROLOGY FOR 1880.

Additional to Rec., 2143-2168.

de **Saulcy**, L: Félix Joseph Caignart. [Biog. notices.] (Zool. Anzeiger, 11 July 1881, jahrg. 4, p. 364.) (Entom. Nachrichten, 1 Aug. 1881, jahrg. 7, p. 232.)

Reiche, L: Notice biographique sur Félix de Saulcy. (Annal. soc. entom. France, s. 5, v. 10, trim. 4, p. 413-416.)

Coleopterist; d. 4 Nov. 1880, in Paris. *G: D.* (2654)

Smith, G: Dole. [Biog. sketch.] (Psyche, April [18 Aug.] 1881, v. 3, p. 199.)

[Biog. notices.] (Zool. Anzeiger, 17 Oct. 1881, jahrg. 4, p. 532.) (Naturae novitates, Nov. 1881, no. 22, p. 183.)

Coleopterist; b. 4 Sept. 1833, in Biddeford, Me.; d. 6 July 1880, in Cambridge, Mass. [*See* Rec., 2164.] *G: D.* (2655)

NECROLOGY FOR 1881.

Blackwall, J: [Biog. notices.] (Entom. Nachrichten, 15 June 1881, jahrg. 7, p. 188.) (Zool. Anzeiger, 27 June 1881, jahrg. 4, p. 340.) (Naturae novitates, June 1881, no. 11, p. 95.) (Amer. nat., Aug. 1881, v. 15, p. 684.) (Psyche, July-Sept. 1881 [March 1882], v. 3, p. 259.]

Arachnologist; b. in 1790; d. 11 May 1881, in Llanrwst, Wales. *G: D.* (2656)

Blackburn, J: Bickerton. [Biog. notice.] (Zool. Anzeiger, 27 Dec. 1881, jahrg. 4, p. 676.)

Lepidopterist; b. in 1845, in Liverpool, England; d. 29 Oct. 1881, in Wandsworth, England. *G: D.* (2657)

de **Chaudoir**, Maximilian. [Biog. notices.] (Naturae novitates, June 1881, no. 11, p. 95.) (Zool. Anzeiger, 11 July 1881, jahrg. 4, p. 364.) (Entom. m. mag., July 1881, v. 18, p. 43-45.)

Coleopterist; b. near Kiew, Russia, in 1818; d. 6 May 1881, in Amélie-les-Bains, Pyrénées-Orientales, France. *G: D.* (2658)

End, Gottfried. [Biog. notice, by E. W. Zöllner.] (Deutscher Bienenfreund, 15 Dec. 1881, jahrg. 17, p. 382.)

Apiculturist; b. in 1829, in Vielau, near Zwickau, Saxony; d. 10 Aug. 1881, in Strehlen, near Dresden, Saxony. *G: D.* (2659)

Garneys, W: [Biog. notice.] (Zool. Anzeiger, 27 Dec. 1881, jahrg. 4, p. 676.)

Practising physician, entomologist, and conchologist in Repton, England; b. in 1831, in Bungay, England; d. 21 Oct. 1881, in Repton. *G: D.* (2660)

Giebel, Christoph Gottfried Andreas. [Biog. notices.] (Naturae novitates, Nov. 1881, no. 23, p. 192.) (Zool. Anzeiger, 27 Dec. 1881, jahrg. 4, p. 676.) (Entom. Nachrichten, 1 Jan. 1882, jahrg. 8, p. 16.)

Prof. of zoology in Halle a. S.; b. in Quedlinburg, Prussia, 13 Sept. 1820; d. in Halle, Prussia, 14 Nov. 1881. *G: D.* (2661)

Hind, Robert. [Biog. notice.] (Zool. Anzeiger, 11 April 1881, jahrg. 4, p. 192.)

Lepidopterist; d. 11 March 1881, in York, England. *G: D.* (2662)

Kawall, Johann Heinrich Carl. [Biog. notices.] (Naturae novitates, May 1881, no. 9, p. 79.) (Zool. Anzeiger, 12 Dec. 1881, jahrg. 4, p. 652.)

Pastor in Pussen, Curland, and entomological writer especially on the hymenoptera of Curland; d. in Pussen, 29 Jan. 1881, aged 82 years. *G: D.* (2663)

Kloss, Moritz. [Biog. notice, by E. W. Zöllner.) (Deutscher Bienenfreund, 15 Dec. 1881, jahrg. 17, p. 382.)

Prof. Dr. Kloss, apiculturist and teacher in Dresden; b. 18 March 1818, in Crumpa, near Merseburg, Prussia; d. 1 Sept. 1881, in Dresden, Saxony. A detailed biography is given in the *Sachischen Schulzeitung*, 16 Oct. 1881. *G: D.* (2664)

Koch, Gabriel. [Biog. notices.] (Entom. Nachrichten, 15 March 1881, jahrg. 7, p. 100.) (Zool. Anzeiger, 28 March 1881, jahrg. 4, p. 168.) (Amer. nat., May 1881, v. 15, p. 422.) (Psyche, July-Sept. 1881 [March 1882], v. 3, p. 259.)

Entomological writer, especially on the geographical distribution of lepidoptera; d. 22 Jan. 1881, in Frankfort-on-the-Main, in his 74th year. *G: D.* (2665)

Putnam, Joseph Duncan. [Biog. sketch, etc.] (Davenport [Iowa] w. gazette, 14 Dec. 1881, y. 41, no. 2005, p. [3], col. 3, 5 cm.; col. 5, 71 cm.)

[Biog. sketch, by H: Edwards.] (Papilio, Dec. 1881, v. 1, p. 223-224.)

[Biog. sketch, by B: Pickman Mann.] (Psyche, Feb. [May] 1882, v. 3, p. 312.)

[Biog. notices.] (Naturae novitates, Feb. 1882, jahrg. 2, no. 3, p. 31.) (Zool. Anzeiger, 20 March 1882, jahrg. 5, p. 148.)

Entomologist, and President of the Davenport academy of natural sciences; b. 18 Oct. 1855, in Jacksonville, Ill.; d. 10 Dec. 1881, in Davenport, Iowa. *G: D.* (2666)

Rolleston, G: [Biog. notices.] (Zool. Anzeiger, 27 June 1881, jahrg. 4, p. 340.) (Naturae novitates, July 1881, no. 13, p. 112.) (Amer. nat., Aug. 1881, v. 15, p. 684.)

Professor of physiology in Oxford, England; d. 16 June 1881, at Oxford, aged 51 years. *G: D.* (2667)

Rosenhauer, Wilhelm Gottlieb. [Biog. notice.] (Entom. Nachrichten, 1 Aug. 1881, jahrg. 7, p. 231-232.)

Professor of zoology in Erlangen, Bavaria; b. 11 Sept. 1813; d. 13 June 1881, in Erlangen. *G: D.* (2668)

DE **Rougemont**, Philipp. [Biog. notice.] (Zool. Anzeiger, 25 July 1881, jahrg. 4, p. 388.) (Amer. nat., Oct. 1881, v. 15, p. 844.)

Professor of natural history and comparative anatomy in Neufchatel, Switzerland; d. 27 May 1881. *G: D.* (2669)

Schmid, Andreas. [Biog. notice.] (Zool. Anzeiger, 17 Oct. 1881, jahrg. 4, p. 532.)

Founder and editor of the *Bienenzeitung;* teacher in Eichstädt, Bavaria; d. 2 May 1881, in Eichstädt. *G: D.* (2670)

Wahnes, Wilhelm. [Biog. sketch, by E. Walther.] (Deutscher Bienenfreund, 1 Nov. 1881, jahrg. 17, p. 335-336.)

Apiculturist; b. 10 Aug. 1826; d. 25 June 1881, in Weimar, Prussia. *G: D.* (2671)

Weston, Walter Philip. [Biog. notices.] (Zool. Anzeiger, 28 March 1881, jahrg. 4, p. 168.) (Entomologist, April 1881, v. 14, p. 96.) (Psyche, July-Sept. 1881 [March 1882], v. 3, p. 259.)

Entomologist; d. 20 Feb. 1881, in Putnam, London, England, in his 29th year. *G: D.* (2672)

BIBLIOGRAPHICAL RECORD.

Arcangeli, G. Osservazioni sulla fioritura del *dracunculus vulgaris* Schott. (Nuovo giorn. bot. ital., 2 Jan. 1879, v. 11, p. 24-41.)

Crit. rev., by H. Müller, entitled "Beobachtungen über *dracunculus.*" (Bot. Jahresbericht . . . Just, 1879, v. 7, p. 136-137, 7 cm.)

Dracunculus vulgaris is fertilized by beetles, chiefly *saprinus*, *dermestes* and *oxytelus*. *D. crinitus* is believed to be close-fertilized by *diptera*. The pollination of *calla* is largely effected by beetles (*oxytherea*). *W: T.* (2673)

Bennett, Alfred W. Recent observations on the fertilization of plants. (Pop. sci. rev., Oct. 1873, v. 12, p. 337-347, pl. 102.)

Considers the pollination of a considerable number of flowers from different groups; and the pollen-gathering parts of certain bees and flies. *W: T.* (2674)

Bonnier, Gaston and C: **Flahault**. Observations sur les modifications des végétaux suivant les conditions physiques du milieu. (Annales des sci. nat., Bot., 1878 [Feb. 1879], ser. 6, v. 7, p. 93-125.)

Abstract, by H. Müller, entitled "Beobachtungen über die Abänderungen der Pflanzen nach den physischen Bedingungen der Umgebung." (Bot. Jahresbericht . . . Just. 1879, v. 7, p. 108, 14 cm.)

As a result of the greater quantity of nectar in high latitudes and altitudes, flowers are more abundantly visited by hymenoptera in Scandinavia and the Alps than in France or Germany at lower altitudes. Honey-dew is more abundant in Scandinavia than in France, and is eagerly gathered by hymenoptera (p. 110). The authors do not believe that the greater intensity of color in alpine and sub-arctic flowers is connected with the greater rarity of insects (p. 114), but attribute it solely to the greater quantity of luminous rays received in summer in high altitudes and latitudes (p. 118). *W: T.* (2675)

Croom, H. B. Observations on the genus *sarracenia;* with an account of a new species. (Annals lyceum nat. hist. N.Y., 5 Sept. 1836 [1848], v. 4, p. 95-104.)

Notes the insect-catching property of the species, and refers to earlier papers on the same subject. *W: T.* (2676)

ENTOMOLOGICAL ITEMS.

The possibility and frequent occurrence of retardation of development in eggs of insects by exposure to cold has been applied, as an invention, to retarding the development of the eggs from which silkworms are to be hatched. While such an application of the principle may be of great service in belated seasons or years unpropitious to the rearing of worms, its inventor can hardly claim much originality.

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The regular Meetings of the Cambridge Entomological Club will be held at 7.45 p.m., on the days following:—

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9 Dec. “
13 Jan. 1882.
10 Feb. “
10 Mar. 1882.
14 Apr. “
12 May “
9 June “

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following:—

26 Oct. 1881.
23 Nov. “
28 Dec. “
25 Jan. 1882.
22 Feb. 1882.
22 Mar. “
26 Apr. “
24 May “

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The regular meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following:—

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9 Dec. “
13 Jan. 1882.
10 Feb. “
10 Mar. 1882.
14 Apr. “
12 May “
9 June “

James H. Ridings, *Recorder.*

The semi-annual meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following:—

12 Dec. 1881.
12 June 1882.

James H. Ridings, *Rec. Sec'y.*

The regular monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following:—

6 Sept. 1881.
4 Oct. “
1 Nov. “
6 Dec. “
3 Jan. 1882.
7 Feb. “
7 Mar. “
4 Apr. “

G: H. Bowles, *Secretary.*

PRIZE ESSAYS.

Due 15 Oct. 1882.—Life-histories of *Sclerostoma syngamus* and of *Strongilus pergracilis.* See Psyche, v. 3, p. 59.

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should reach the editors by the 10th of the month preceding the one in which they are to appear.

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J. HENRY COMSTOCK,
Department of Entomology,
The Cornell University,
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No. 93 was issued 29 Apr. 1882.

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EDITED BY

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Cambridge, Mass., U. S. A.: Published by George Dimmock.

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PSYCHE.

FRAGMENTS OF THE COARSER ANATOMY OF DIURNAL LEPIDOPTERA.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

(*Concluded from p. 309.*)

10. THE LARVA OF *EUPHOEADES TROILUS*, OF NORTH AMERICA.

Muscular system. The longitudinal system of muscles, which we have usually found to be made up on the dorsal and ventral surfaces of each half of the body of double or treble bands, is here composed both above and below of one broad ribbon on each side. Each of the lower ones is made up of about fifteen, of the upper of about twenty-five, closely contiguous but independent cords similar to one another in every respect.

The investing muscular walls of the stomach are thicker than usual and almost entirely composed of transverse, parallel, muscular fibres, with a few hardly noticeable longitudinal threads, and a dorsal ribbon of a dozen or more parallel threads besides a similar ventral band.

Digestive system. The stomach is 6.5 mm. in diameter; at its extremity an investing band of strong muscles enwraps the canal, contracting its diameter to 1.75 mm., while the intestine is 3 mm. broad; the intestine and colon are very short (together 7.5 mm. long) compared with the stomach, and so also is the oesophagus.

The malpighian vessels originate in a very slender thread, 1.1 mm. long, which then expands into a vermiform, subfusiform, swollen gland, 1.45 mm. long and 0.45 mm. broad, contracted slightly before the bluntly rounded apex; the lower branch is thrown off from its tip, and immediately afterward the other two; they are very slight and very short as compared with *Danais* or *Eurymus;* the upper branch extends as far as the posterior margin of the fourth abdominal segment.

Nervous system. The nervous cords are closely united, but can be seen to be distinct throughout their whole length. The distance between the first and second body-ganglia is 2.5 mm.; between the second and third 3.25 mm. The cords at each side of the third are parallel for a very short distance and then diverge. The fourth ganglion is 1.75 mm. distant from the third, and is situated near the middle of its segment, while the others, as a general thing, are near the anterior edge of the segments. The tenth and eleventh ganglia are completely united; together they are no broader than, but twice as long as, the ninth ganglion; from the posterior border, four long, equal and equally divergent nerves are thrown off, two on one side and two on the other, and these seem to be the only nerves emitted.

There are two sets of lateral nerves to each ganglion; the posterior originates at the posterior outer side and is directed outward and somewhat backward; it forks very shortly beyond its origin, sometimes, in the anterior part of the body, at the very origin; the anterior set consists of two parallel nerves, which start, the anterior from the anterior outer side, the posterior from near the middle of the outer margin, and extend outward at right angles to the cord; the anterior of these parallel nerves is sometimes connected, just beyond its base, with the cord just in advance of the ganglia; at least it is so in the seventh abdominal segment where the nerves are somewhat modified: this anterior nerve may be the same as that which originates in other species from the cord itself just in advance of the ganglia.

Glandular system. The initial duct of the silk vessels runs to the middle of the first abdominal segment, beyond which it expands to a vessel 0.65 mm. broad, which runs straight along the ventral surface to the front part of the third abdominal segment, turns abruptly back to the origin of the thicker portion, then bends at right angles and runs in a vermiform course upward along the first and second abdominal segments and terminates upon the back. The whole of the thicker part of the vessel is 21 mm. long.

Male generative organs. The testes are situated at the posterior part of the dorsum of the fifth abdominal segment, are plump, obovate, well rounded, 1.1 mm. long and 0.85 mm. broad.

11. THE LARVA OF *EPARGYREUS TITYRUS*, OF NORTH AMERICA.

Digestive system. As in *Euphoeades troilus* the stomach is very large as compared with the rest of the alimentary canal; it measures 19.5 mm. in length, while the crop measures 3.5 and the intestine and colon together 5 mm.; the oesophagus proper is exceedingly short.

The salivary glands are slender, crinkled ribbons of uniform diameter (0.14 mm.) and 5 mm. long, reaching to the front of the stomach, where the extremity is attached by a very slender, pellucid, suspensory thread to tissue connected with the dorsal vessel.

The malpighian vessels originate in a slender, thread-like tube, smaller than the duct of the silk vessels, from the constriction at the extremity of the stomach; it extends forward along the hinder extremity of the stomach for 1.6 mm. and then sends off the inferior branch, which passes along the stomach nearly to the middle of the third abdominal segment and there turns upon its course. The main stem continues for 1.25 mm. further before dividing, a feature in which this insect is entirely different from all the others described, and its two forks pass forward as usual along the sides of the stomach, the upper to the middle or slightly in advance of the middle, the lower (or middle of the three branches) to the front of the third abdominal segment, and then abruptly retrace their course. They are exceedingly delicate, being only 0.045 mm. in width, and are ribbons rather than cords; in their delicacy and slight development, but not at all in the characteristics of their origin, they agree with *Euphoeades troilus*.

Nervous system. The first body-ganglion is separated from the suboesophageal ganglion by a narrow space, not more than one-third the length of the former, which is somewhat longer than broad. The fourth body, or the first abdominal ganglion is separated from the one in front by less than the diameter of the latter, and is situated wholly within, but at the hinder border of, the third thoracic segment; the other ganglia, even the third thoracic, are situated in the middle of their respective segments; the last two ganglia are completely amalgamated, forming a single, subfusiform oval mass more than twice as long as broad, slightly broader than and nearly twice as long as the ninth ganglion. The cords between the ganglia are quite distinct from each other in front of each ganglion for one-third or one-fourth the distance to the ganglion next in advance; in front of this they are attingent and apparently consolidated, although it can be seen that the ribbon is composed of two elements. The lateral nerves consist of a single thread issuing from the anterior outer angle of the ganglion, directed laterally and a little forward; and a pair, issuing separately, but in close proximity, from the posterior outer angle, and directed laterally and somewhat posteriorly; these last are also very slightly divergent.

Silk vessels. These consist, first, of a long thread-like tube or duct, 0.9 mm. in diameter, having a slightly tortuous course through the thoracic segments; and second, of a larger vessel, a mere enlargement of the tube, which commences to expand as it enters the abdominal region, and continues of the same diameter, 0.5 mm., as far as the beginning of the fifth abdominal segment, then turns abruptly back upon itself, outside its former course, as far as the front of the second abdominal segment; again turns back with equal abruptness, outside or above its previous course, and, diminished to nearly one-half its former diameter, extends nearly to the middle of the third abdominal segment; it then turns upward at right angles along the walls of the stomach to the middle of the sides of the same, or a little higher, and again resumes its general backward direction; on this it extends, with a slightly wavy course, as far as the end of the stomach, when it turns downward and inward again and soon terminates in a blunt tip, its extremity scarcely slenderer than its width when it is freed from the coils on the sides of the stomach. The coiled or reversed portion covers a distance of 5.75 mm. The initial duct is 9.5 mm. long, the stouter part of the vessel 12 mm. long, and the slender terminal portion 11.5 mm. long.

Male reproductive organs. The testes consist of a pair of quadrilobed, elongated, subreniform organs, terminating anteriorly in a little thread less than half as long as themselves; and are situated scarcely behind the middle of the fifth abdominal segment.

[*End*.]

INTERNAL ORGANIZATION OF *HESPERIA ETHLIUS* CRAM., AS OBSERVED IN THE LIVING ANIMAL.

BY HELEN SELINA KING, SAN ANTONIO, TEXAS.

[*With editorial annotations.*]

THE larva of *Hesperia ethlius* may be found on the *Canna* or Indian-shot plant. This larva being somewhat diaphanous, and thus affording facilities for an examination of its internal organization, I have made of it a careful study.

The egg, when first laid on a leaf, is pinkish, smooth, biscuit-shaped, and with a central depression on its upper, convex side. As it matures it grows white. The larva emerges in six days, and eats up the upper third of its shell, which is detached like a lid, leaving a cup still adhering to the plant. At this time it is 1.6 mm. long, dull whitish; head very large, black, glossy, and bilobed. True feet and anal tip black. In a few hours it sheds its skin.

Having eaten a small portion of the leaf, and thus prepared a section of it for its use, the larva folds this over and confines it to its place with a few stitches of silk, enlarging this temporary retreat, or folding a new section, as it grows, and just before the pupal change lining it with silk. It feeds from this tubular case, just along its edges, retreating within when alarmed. It forcibly ejects all excrement from the upper, free end, together with all exuviae, so that, although it evidently sheds its skin several times, these cast skins cannot be found.

The larva increases more rapidly in size at its early stages than later, and doubles its length in 24 hours. It is cylindrical, flattened on the venter and presents rather a large upper surface. At this time a transverse band is seen on dorsum of the 11th segment, connecting the posterior pair of stigmata which are faintly visible. Under a microscope of 75 diameters may also be seen the dorsal vessel lying over and contiguous to the alimentary canal, and a pair of small bodies between these and the pleura, situated in the 9th segment, on each side [testes in ♂, ovaries in ♀].

With its further development the body becomes more opaque, from the presence of food in the alimentary canal. When it is 6 mm. long the small organs in the 9th segment are well defined, being four-chambered, with the divisions suboval, the extreme ones terminating sometimes [in the ♀] in an acute point, the anterior one longest. These vessels are about the size round of a broom-straw and about twice as long as wide; of a pale yellow, and opaque.

Lying over the alimentary canal, and seemingly formed of a fold of it, are the two longitudinal tubular bodies, a little flattened, which are interrupted but not obliterated at the intersection of the segments [dorsal vessel, with its valves]. This tubular fold seems to recede from and approach the median line, each time apparently opening and closing on the posterior half of its length for the admission of fluid. There is a vermicular motion throughout these parts, but no fluid can actually be seen flowing through them.

The larva transforms in ten days and is, when fully grown, 44 mm. long. As it approaches maturity the four-chambered vessels [ovaries] become cylindrical, and twice their original length, and with points on the lower sides from the constricted parts. The fuller development of the alimentary canal and the longitudinal tubular fold [dorsal vessel] causes these smaller vessels [ovaries] to recede more from the dorsal median line and approach nearer to the pleura in the comparatively free space occupied only by the ramifications of the tracheae. Here they seem to be balanced upon and permeated by fine tracheae from the spiracle of the 9th segment, and move synchronously with the general impulse received through the series of spiracles on the pleura but begun in the pair on the 11th segment. This pair of spiracles, connected by a short transverse band or spiracular tube, gives rise to two sets of tracheae: one penetrating no farther than into the subcutaneous enveloping membrane, ramifies there, giving no signs of activity; the other responds to, if it does not originate, every impulse of the larva.

Each of the spiracles has a similar double set of tracheae acting in the same way. The air tubes of the passive set just referred to, are inclined a little backward, transversely, at their free ends, while those of the active set, ramifying within the inner parts of the body, tend forward. A part of them, meeting on the middle of the venter, arch over a small, misty, suboval dot [nervous ganglion] which has a faint sympathetic movement with the tracheae touching it.

One of these misty, white bodies is situated on each segment, beginning, from behind, at the 10th, where it seems to be a double, oval dot, and is presumably composed of the ganglion of the 11th and 10th. The next four anterior to this are single. The fifth and fourth are near each other and nearer the 3rd segment, showing a forward tendency. Each of the three thoracic segments has its separate ganglion, equidistant from each other, and nearer together than the series posterior to them. Each of these ganglionic nuclei is situated in the anterior angle of a triangle of white filaments whose base line is almost straight across the segment.

On the dorsum and ending on the venter are long tubes (malpighian vessels) one on each side, first traceable near the 10th spiracle, with which they are connected by a bent tubular line. Following a direct course forward from this as far as the 6th, these tubes recurve and return to the 9th, going forward once more at an acute angle and losing themselves in the 5th, but becoming again visible just below the third segment. These tubes are of the same size and appearance as the tracheae, with which they come in frequent contact. At the posterior end of the third segment, are the blunt ends of a pair of tubes [silk vessels]. These may be faintly traced almost to their position on the head as the spinnerets.

At times when the larva is undisturbed, there seems to be an almost total suspension of motion in the spiracles and in all the parts affected by them. With the entrance of air into the system of spiracles there is a regular pulsating movement in the dorsal vessel, and in the small four-chambered bodies in the 9th segment [ovaries]. The entrance of air into the posterior pair of spiracles seems to give the initial impulse which travels so rapidly along the series and its ramifications that almost immediately the head of the insect begins to move from side to side as if affected by the same influences which affected the other parts. This occurs when the leafy covering of the larva is cut open and light and air admitted.

The first conscious effort of the larva when its sheath [nest] is opened is directed toward the elaboration of silk fluid with which to enclose itself once more within its case. With this purpose it eats rapidly and the silk fluid is seen at the same time accumulating in and near the thoracic segments. The larva uses its short, black, front pair of feet to unite the threads which it spins back and forth, forming a cord of 50 to 75 threads, as may suit its purposes.

The pupa exhibits no specially interesting features. It is pale green, with faint traces of the outer set of tracheae still visible; broad at anterior end, with a sharp black spine from its extremity, by which it is attached to a mass of fine white silk. Body cylindrical, tapering at anal end. A loose girdle of silk passes around its body, and its entire length rests against a delicate layer of white silk. If disturbed it moves with great rapidity. It transforms in ten days. The motions of the imago of this hesperian are very rapid.

I have not sufficient data to make this an exhaustive monograph, but other students may have added what I have omitted. If not, we may leave to time and diligence the further discovery of such facts as are yet unknown.

CIRCULATION OF BLOOD IN THE LARVA OF *HYDROPHILUS*.

BY GEORGE DIMMOCK, CAMBRIDGE, MASS.

Examination of living larvae of *Hydrophilus* under the microscope, the past summer, revealed the circulation of blood in their antennae and trophi, which is so distinctly visible and so curious in its directions as to be worthy of notice.

The blood of the larva of *Hydrophilus*, after leaving the anterior extremity of the dorsal vessel or heart and entering the head, divides itself into two lateral branches, one of which descends on each side of the oesophagus, the two branches reuniting beneath the oesophagus, a little anterior to their division on its upper side, to form a median stream. Between the point where the streams separate and reunite, each stream gives off three branches, all of which flow in the same direction as the middle stream formed by the reunion of the two lateral streams, that is, toward the anterior part of the head. The median stream formed by the reunion of the two lateral streams, which is, of course, more ventral in position than the six other streams, enters the middle of the labium, and passes along the dorsal half of that organ until it nearly reaches the bases of the labial palpi. Here the stream turns back laterally and ventrally, so that the returning stream is along the ventral half and in both lateral portions of the labium. Each of the two streams of blood next toward the dorsum, from the one which supplies the labium enters the outer side of a maxilla, flows along the outer side nearly to the distal end of the basal joint of the maxilla, and returns along the inner side of the joint to the head. The two streams next in order, as the dorsal side of the head is approached, are those that supply blood to the mandibles. Each of these streams enters the mandible on its inner side, flows nearly to its tip, and returns on its outer side. Dorsally from the streams supplying the mandibles are the streams that flow into the antennae, which, in the larvae of *Hydrophilus* are used as trophi. Each stream enters its antenna on the inner side, flows to the distal end of the basal joint, and returns on the outer side of that joint to the head. After their return to the head, the currents of blood from the antennae and trophi are lost among the muscles of the head.

I have attempted, in fig. 5, by arrows, to give a more readily comprehensible idea of the direction and extent of the above-mentioned streams of blood, than can be given by mere description. To complete the figure one should imagine a stream of blood toward the head, beneath the arrow in the middle of the labium: that is, with the head in the position indicated in the figure, the microscope can be focused first on a stream flowing outward in the labium, and then, with the fine adjustment, the tube of the microscope can be lowered until a return stream toward the head is brought into focus. I have not attempted to indicate, on the sketch, the currents of blood in the head, as they would too greatly complicate the figure.

FIG. 5.

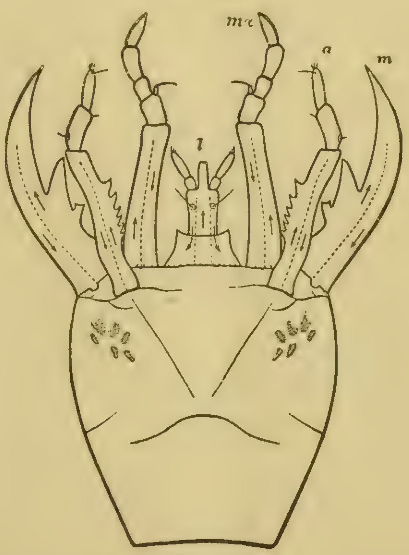

FIG. 5.—Dorsal view of head of young larva of *Hydrophilus ?piceus*. Direction of blood-currents in the appendages indicated by arrows. Dotted lines indicate partitions between blood-currents. *a*, antenna; *m*, mandible; *mx*, maxilla; *l*, labium. Magnified 20 diameters.

The currents of blood are not, of course, confined in cylindrical arteries and veins, as they are in the vertebrates, and, consequently, I have used the terms streams and currents of blood. These streams of blood occupy nearly the whole interior cavity of the appendages in the larvae of *Hydrophilus*, the outward and return currents being separated by partitions, of apparently a porous nature, which are represented in the figure by dotted lines. These partitions, like those described by C. G. Carus[1] in the abdominal appendages of the larvae of

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[1] Carus, C. G. Entdeckung eines einfachen vom Herzen aus beschleunigten Blutkreislaufes in den Larven netzflüglicher Insecten. Leipzig, 1827.

Agrion puella, are very delicate, and extend, in the antennae, mandibles and maxillae, from the upper to the lower chitinous walls. In no case have I observed corpuscles of blood pass through these porous partitions, but they may not be impervious to the fluid portion of the blood. They serve to guide the currents of blood and to cause it to circulate in the appendages. It is not necessary for these porous partitions to extend into the apical joints of each appendage, the blood which fills these joints not needing rapid changing. Carus notes that, in the larva of *Ephemera vulgaris*, the blood has a distinct outward and return current in the basal joint of each antenna. This is the case, as will be seen by the figure, in the antennae of the larva of *Hydrophilus*, where the partition between the two streams ends just posterior to the distal end of the basal joint of each antenna.

Verloren[2] notes that, in the antennae of the larvae of *Ephemera diptera* he had never been able to observe the circulation of the nutrient fluid, except in the first joint, where the current enters on the inner side and returns on the outer side. The direction and extent of the currents of blood in the antennae are the same in the larva of *Ephemera diptera* as in that of *Hydrophilus*, but, as the literature at my command fails to give the necessary data in regard to the currents of blood in the antennae of other insects, and I have not been able to obtain specimens suitable for further observation, it is unsafe to predict that the currents of blood in the antennae of insects generally follow a similar course.

It will be seen, at first glance, on the figure, that, with one exception, all the streams of blood have their outward course on the inner side of each appendage; the exception is in the maxillae, where the outward course of the blood is on the outer side. It would be interesting to know if, in other insect larvae, the streams of blood entered the maxillae on the outer and returned on the inner side.

As the circulation in the appendages of the head of the larvae of *Hydrophilus* has no capillaries, the progress of the blood is so little checked that one can count the pulsations of the heart as well in the returning currents as in the outgoing ones.

For the purpose of detailed study of the circulation of the blood, not only in the antennae and trophi but in all parts of the body, the young larvae of *Hydrophilus* offer special advantages, on account of their transparency, which is so great that their blood-corpuscles can be readily seen, under the microscope, without using extremely high powers. The egg-cases of *Hydrophilus* can be collected in summer,[3] and the larvae easily reared in a small aquarium. If a suitable aquarium be chosen, and placed beneath any kind of a fly-trap, in such a way that the flies captured will fall, living, into the water, a healthy brood of larvae of *Hydrophilus* can be fed with a minimum of attention.

Paris, France, 16 Dec. 1881.

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[2] Verloren, M. C. Mémoire en résponse à la question suivante: Éclaircir par des observations nouvelles le phénomène de la circulation dans les insectes . . . 1844.

[3] See paper by W. H. Garman, entitled, "The egg-case and larva of *Hydrophilus triangularis* Say." (Amer. naturalist, Aug. 1881, v. 15, p. 660-663, fig. 1-3.)

THE DOMESTICATION OF *PAPILIO THOAS* (*CRESPHONTES*) IN DUTCHESS COUNTY, N. Y.

BY WILLIAM BUCK DWIGHT, POUGHKEEPSIE, N. Y.

Dr. E. L. Beadle, of Poughkeepsie, N. Y., noticed, on 8 Sept. 1880, some curious caterpillars feeding on a bush of *Dictamnus fraxinella* in his front lawn. The next day he sent several of these to me, and soon after imprisoned some more in a box at his house. Recognizing them as papilios, but not being able to determine the species from the larva, I tended them until they assumed the chrysalis state the third week in September. Four of them developed into butterflies during the last week in February 1881, and the first and second weeks in March; one more expanded early in April, about which time some in Dr. Beadle's box also assumed the imago state. I had no difficulty in recognizing them at once as good specimens of *Papilio thoas*, whose proper home is on the orange tree in the southern states. I have since compared them with typical specimens, and find no essential difference. Dr. Beadle suggested, what seems to me very probable, that the eggs of these lepidoptera might have been brought here in the southern moss (in which orange leaves are very likely to be entangled) which is packed about the Florida oranges landed here.

On 30 March 1881, I announced the above facts in a paper read before the Poughkeepsie society of natural science. Attention having been thus called to the subject, this butterfly was found in several private collections here, its true character not having before been recognized.

As the spring opened, Mr. James M. De Garmo, of Rhinebeck, N. Y., set the boys in the academy of which he is the principal, on the lookout for these butterflies, and they found quite a number before long. As the autumn came in they found them to be by no means rare.

I had at first supposed that this insect was only partially domesticated, living solely in the cultivated grounds around our mansions, — on the *Dictamnus fraxinella*, and on the hot-house orange trees. Later in the season their frequency led me to suspect that they were more thoroughly established. On 17 Sept. 1881, while making geological explorations in the woods four or five miles south of Poughkeepsie, I found quite a number of larvae of *Papilio thoas* feeding on the wild "thorn bush," *Zanthoxylum americanum*, which, like the *Dictamnus fraxinella*, is a member (with the orange) of the *rutaceae*, and has orange-scented leaves. These were on different bushes about a mile apart. Subsequently I also found some chrysalids of the same, suspended for the winter under the stones of farm walls.

It is thus established that this southern papilio, which has already been reported in Canada, and six or seven of our northern States, is thoroughly domesticated in this part of New York state, finding an abundance of its orange-flavored food in our woods, and weathering our winters in safety.

VASSAR COLLEGE, 11 FEB. 1882.

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Authors and societies are requested to forward their works to the editors as soon a published. The date of publication, given in brackets [ ], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

Corrections of errors and notices of omissions are solicited.

Cheeseman, T. F. Fertilization of *glossostigma*. (Nature, 27 Dec. 1877, v. 17, p. 163-164, 15 cm.)

Notice, by H. Müller, entitled "Befruchtung von *glossostigma*." (Bot. Jahresbericht . . . Just, 1877, v. 5, p. 746, 2 cm.)

Shows how cross-fertilization is aided by sensitive motion of the stigma. *W: T.* (2677)

Darwin, C: Bees and fertilization of kidney beans. (Gard. chronicle, 24 Oct. 1857, p. 725, 28 cm.)

Shows how bees [*apis mellifica*] act while collecting nectar, and believes that "if every bee in Britain were destroyed, we should not again see a pod on our kidney beans." Records the perforation of the flowers for their pollen by *bombus* and the subsequent use of the perforations by *apis*. *W: T.* (2678)

Darwin, C: Notes on the fertilization of orchids. (Ann. and mag. nat. hist., Sept. 1869, ser. 4, v. 4, p. 141-159.)

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Hunt, J. Gibbons. Sensitive organs in *stapelia*. (Proc. acad. nat. sci. Phil., 27 Aug. 1878, v. 30, p. 292-293, 27 cm.; 1 fig.)

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Abstract. (Bull. Torrey bot. club, Dec. 1879, v. 6, p. 280, 12 cm.)

Crit. rev., by H. Müller, entitled "Reizbare Organe bei *stapelia*." (Bot. Jahresbericht . . . Just, 1879, v. 7, p. 139-140, 2 cm.)

The stench of the flowers of *s. asterias* attracts many flies, which feed on the floral nectar. When the proboscis of a fly comes in contact with one of the so-called staminal glands it is seized by the latter, which is compared to a "steel trap." If too small to remove the pollen-masses, the fly remains in the trap. *W: T.* (2681)

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States that flies feed on the sporiferous mucus of *phallus impudicus*, and believes them instrumental in spreading hospital gangrene, etc. *W: T.* (2682)

Lichtenstein, Jules. Les cynipides. 1re partie. Introduction. La génération alternante chez les cynipides par le Dr. H. Adler, de Schleswig, traduit et annoté par J. Lichtenstein. Suivi de la classification des cynipides d'après le Dr. G. Mayr, de Vienne. Montpellier, Coulet, 1881. 141 p., 3 pl., 25×17.

Notice, by L. O. Howard, entitled "Alternate generation in *cynipidae*. (Psyche, Mar.-Apr. [June] 1881, v. 3, p. 328-329.)

French translation of H. Adler's "Ueber den Generations-wechsel der Eichen-Gallwespen" (Zeits. für wiss. Zool., 1 Feb. 1881, bd. 35, p 151-246, pl. 10-12), with reprint of the plates, and with an historical introduction by the translator, a biographical notice of Dr. Adler, and a list, classified after Mayr, of the described *cynipidae* of the world. *L. O. H.* (2683)

Macbride, James. On the power of *sarracenia adunca* to entrap insects . . . . (Trans. Linn. soc., 19 Dec. 1815 [1818], v. 12, p. 48-52.)

Describes the capture of flies by the leaves, to which they are drawn by nectar. Spiders and "a small species of *phalaena*" are able to enter and leave the pitchers at will. In the mass of putrid insects were always found one or two maggots, which were the offspring of a viviparous fly. From certain insect remains occasionally found, the author suspects that a large *nepa* may use the pitchers as storehouses for captured prey. [Hagen, Bibl. entom., v. 1, p. 509, gives the date 1857]. *W: T.* (2684)

Martindale, I: C. On the distribution of plants. (Proc. acad. nat. sci. Phil., 18 Sept. 1877, v. 29, p. 285-286.)

Includes a notice of a *phallus*, which attracts large numbers of flies. *W: T.* (2685)

Meehan, T: On the agency of insects in obstructing evolution. (Proc. acad. nat. sci. Phil., 1872, v. 24, p. 235-237.)

Describes a number of floral forms in *linaria vulgaris*. These are prevented from perpetuating themselves as races by being intercrossed through the agency of *bombus*. *W: T.* (2686)

Meehan, T: Boring of corollas from the outside by honey-bees. (Proc. acad. nat. sci. Phil., 15 Jan. 1878, v. 30, p. 10-11.)

Crit. rev., by H. Müller, entitled "Die Honigbiene Blumenkronen von aussen anbohrend." (Bot. Jahresbericht . . . Just, 1879, v. 7, p. 148, 5 cm.)

States that *salvia splendens* is perforated for its nectar by *apis mellifica*. States objections to the belief that the flowers in question are pollinated by insects. *W: T.* (2687)

Meehan, T: Cross-fertilization in *campanula*. (Proc. acad. nat. sci. Phil., 18 July 1876, v. 28, p. 142-143, 10 cm.)

States that flowers of *campanula* and *cichorium* do not require insect aid in their pollination, although the latter are visited by pollen-eating insects. *W: T.* (2688)

Meehan, T: The *drosera* as an insect catcher. (Proc. acad. nat. sci. Phil., 20 July 1875, v. 27, p. 330.) (Ann. and mag. nat. hist., Mar. 1876, ser. 4, v. 17, p. 258-259.)

Notes the capture of insects by *drosera filiformis*, *d. longifolia* and *d. rotundifolia*, and discusses the benefit derived therefrom. *W: T.* (2689)

Meehan, T: Fertilization in beans. (Proc. acad. nat. sci. Phil., 3 Oct. 1876, v. 28, p. 193-194, 12 cm.)

States that although freely visited by bees [*apis?*], varieties of *phaseolus* do not intermingle. *W: T.* (2690)

Meehan, T: Fertilization of flowers by insect agency. (Proc. acad. nat. sci. Phil., 6 June 1876, v. 28, p. 108-110.)

Crit. rev., by Asa Gray, under same title. (*op. cit.*, p. 110-112.)

Believes that *scrophularia canina*, *leucanthemum*, *trifolium pratense* and *staphylea* are self-fertilized, though admitting that they are visited by insects. *W: T.* (2691)

Meehan, T: Fertilization of *pedicularis canadensis*. (Proc. acad. nat. sci. Phil., 3 June 1873, v. 25, p. 287, 8 cm.) (Ann. and mag. nat. hist., Dec. 1873, ser. 4, v. 12, p. 497.)

Self-fertilization is said to be impossible, and no insects were seen to enter the flowers, which, nevertheless, fruited abundantly. A *bombus* perforates the flowers for their nectar. *W: T.* (2692)

Meehan, T: Fertilization of *yucca*. (Proc. acad. nat sci. Phil., 2 Dec. 1873, v. 25, p. 414, 4 cm.)

States that, in Pennsylvania, *yucca* is pollinated by *pronuba yuccasella*, every year. In the Rocky Mountains, in 1871, *y. angustifolia* was found seeding abundantly, while in 1873 it did not fruit at all: it is suggested that in that region *pronuba* may be replaced by some periodical insect. *W: T.* (2693)

Meehan, T. [On the flowers of *asparagus*.] (Proc. acad. nat. sci. Phil., 4 June 1872, v. 24, p. 138-139.)

The plants of *a. officinalis* are said to be dioecious. Various insects, including *apis mellifica*, visit the staminate flowers for pollen. None visit the pistillate flowers. Pollination seemed wholly accomplished by the wind. *W: T.* (2694)

Meehan, T: Insectivorous sarracenias. (Proc. acad. nat. sci. Phil., 15 June 1875, v. 27, p. 269, 8 cm.)

Comments on J. H. Mellichamp's "Notes on *sarracenia variolaris* (Proc. Amer. assoc. advanc. sci., 1875, v. 23, pt. 2, p. 113-133) [Rec., 579]. *W: T.* (2695)

Meehan, T: [Insects and flowers] (Proc. acad. nat. sci. Phil., 2 Aug. 1870, v. 22, p. 90, 6 cm.)

States that *salvia* and *petunia* are perforated for their nectar, by bees: but pollination is effected by nocturnal moths. Describes two sorts of male flowers in *castanea vesca*, only one of which probably aids in fertilization. *W: T.* (2696)

Meehan, T: Note on *phallus foetidus*. (Proc. acad. nat. sci. Phil., 3 Oct. 1876, v. 28, p. 194-195, 7 cm.)

"Meat flies" abounded on this fungus. The same insects are said to visit and oviposit in the flowers of *stapelia variegata*. *W: T.* (2697)

Meehan, T: Poisonous character of the flowers of *wistaria sinensis*. (Proc. acad. nat. sci. Phil., 2 June 1874, v. 26, p. 84, 4 cm.)

Notes the popular belief that the flowers of the plant named are destructive to bees. States that the flowers were continually visited by the honey bee [*apis mellifica*], and others, without, so far as he could see, any fatal results following. *W: T.* (2698)

Müller, Fritz. In Blumen gefangene Schwärmer. (Kosmos, 1878, v. 3, p. 178-179.)

Discusses the pollination of Asiatic species of *hedychium*, as cultivated in Brazil. One species has so narrow a tube that it frequently captures, by their proboscides, such moths as *macrosila rustica* and *m. antaeus*. *W: T.* (2699)

Müller, Hermann, *see* PACKARD, A. S., *jr.*, Moths entrapped by an asclepiad plant [Rec., 1671].

Müller, Hermann. Alpenblumen . . . [Rec., 2175.]

Rev., by Francis Darwin, entitled "Alpine flowers." (Nature, 10 Feb., 1881, v. 23, p. 333-335.)

Rev., by W: Trelease, entitled "Dr. Hermann Müller's Alpenblumen." (Psyche, Feb. [July] 1881, v. 3, p. 175, 25 cm.) *B: P. M.* (2700)

Müller, Hermann. Anwendung der Darwinschen Lehre auf Bienen. (Verhandl. naturh. Vereins der preuss. Rheinl. und Westfälens, 1872, jahrg. 29, folge 3, jahrg. 9, p. 1-96, pl. 1-2.)

Discusses the evolution of the various groups of bees, as explained by their habits; especially that of providing their young with honey and pollen gathered from flowers. *W: T.* (2701)

Müller, Hermann. Befruchtung von *glossostigma.* (Bot. Jahresbericht . . . Just, 1877, v. 5, p. 746, 2 cm.)

Notice of T. F. Cheeseman's "Fertilization of *glossostigma* (Nature, 27 Dec. 1877, v. 17, p. 163-164) [Rec., 2677]. *W: T.* (2702)

Müller, Hermann. Beobachtungen an westfälischen Orchideen. (Verhandl. des naturhist. Vereins der preuss. Rheinl. und Westfälens, 1868, jahrg. 25, s. 3. jahrg. 5, p. 1-62, pl. 1-2.)

Describes the fertilization of *cypripedium calceolus, epipactis viridiflora, e. microphylla, platanthera bifolia, p. chlorantha* and *p. solstitialis,* noting a considerable number of their insect visitors. A number of experiments, in fertilizing orchids with their own pollen and with that of other species, are recorded.

W: T. (2703)

Müller, Hermann. Ueber die Bluthenformen von *salvia pratensis* L., und die Bedeutung der weiblichen Stöcke. (Bot. Zeitung, 29 Oct. 1880, v. 38, c. 749-750, 21 cm.)

Crit. rev. of H. Potoniés' paper of same title (Sitzungsber. Ges. naturf. Freunde, Berlin, 15 June 1880, no. 6, p. 85-92) [Rec., 2720]. *W: T.* (2704)

Müller, Hermann. Die Honigbiene Blumenkrone von aussen anbohrend. (Bot. Jahresbericht . . . Just, 1879, v. 7, p. 148. 5 cm.)

Crit. rev. of T. Meehan's "Boring of corollas from the outside by honey-bees (Proc. acad. nat. sci. Phil., 15 Jan. 1878, v. 30, p. 10-11) [Rec., 2687].

W: T. (2705)

Müller, Hermann. Nectar, was er ist, und einige seiner Verwendungen. (Bot. Jahresbericht . . . Just, 1879, v. 7, p. 123-125.)

Abstract of W: Trelease's "Nectar, its nature, occurrence, and uses . . . [Rec., 2475]. *W: T.* (2706)

Müller, Hermann. Reizbare Organe bei *stapelia.* (Bot. Jahresbericht . . . Just, 1879. v. 7, p. 139-140. 2 cm.)

Crit. rev. of J. G. Hunt's "Sensitive organs in *stapelia* (Proc. acad. nat. sci. Phil., 27 Aug. 1878, v. 30, p. 292-293) [Rec., 2681]. *W: T.* (2707)

Müller, Hermann. Weitere Beobachtungen über Befruchtung der Blumen durch Insekten. **2.** (Verhandl. des naturhist. Vereins der preuss. Rheinl. and Westfälens, 1879, jahrg. 36, s. 4, jahrg. 6, p. 198-267, pl. 2-3.)

Ital. tr., with comments, by F. Delpino, entitled "Nuove osservazione sovra piante entomofile." (Rivista bot., 1880, p. 27-39.)

Records additional insect visitors to a large number of flowers, and shows the mode of fertilization in a number not previously studied. [*See* Rec., 2577.]

W: T. (2708)

Myers, A. T. Fertilization of the pansy. (Nature, 10 July 1873, v. 8, p. 202, 7 cm.)

Describes the fertilization of *viola tricolor* by "a small fly." *W: T.* (2709)

Nectar, its nature, occurrence and uses. (Amer. nat., Nov. 1880, v. 14, p. 803.)

Rev. of W: Trelease's work of same title [Rec., 2475]. *G: D.* (2710)

Ogle, W: The fertilization of certain plants, *didynamia.* (Pop. sci. rev., Jan. 1870, v. 9, p. 45-56, pl. 56.)

Shows how insects aid in the pollination of species of *pedicularis, melampyrum, rhinanthus, teucrium, digitalis, stachys, brunella, scrophularia, gesneria, antirrhinum, thymus* and *origanum.* *W: T.* (2711)

Ogle, W: The fertilization of *salvia* and of some other flowers. (Pop. sci. rev., July 1869, v. 8, p. 261-274, pl. 48-49.)

Shows how pollination is effected by insect agency in *salvia, malvaceae, lopezia* and *delphinium.*

W: T. (2712)

Ogle, W: The fertilization of various flowers by insects. . . . (Pop. sci. rev., Apr. 1870. v. 9, p. 160-172, pl. 59.)

Considers the intercrossing of flowers in certain *compositae, ericaceae, leguminosae* and *fumariaceae.*

W: T. (2713)

[?**Oliver**, Daniel.] On dimorphism in *primula.* (Nat. hist. rev., Jan. 1862, v. 1, no. 5, p. 118, 8 cm.)

Notice of C: Darwin's "On the two forms, or dimorphic condition, in the species of primula. . . . [Rec., 2373]. *W: T.* (2714)

[?**Oliver**, Daniel.] On the two forms, or dimorphic conditions, in the species of primula, and on their remarkable sexual relations. . . . (Nat. hist. rev., July 1862, v. 1, no. 7, p. 235-243.)

Rev. of C: Darwin's paper of same title (Journ. Linn. soc., Bot., 21 Nov. 1861, v. 6, p. 77-96) [Rec., 2373].

W: T. (2715)

[?**Oliver**, Daniel.] On the various contrivances by which British and foreign orchids are fertilized by insects. . . . (Nat. hist. rev., Oct. 1862, v. 1, no. 8, p. 371-376.)

Rev. of C: Darwin's book of same title [Rec., 2378].

W: T. (2716)

Patterson, Alexander. Bees poisoned by the foxglove, *digitalis purpurea.* (Gard. chronicle, 31 July 1880, n. s., v. 14, p. 148, 6 cm.)

"After they had fed for some time on the flowers of the foxglove they became stupid, and after leaving the foxglove they went into the flowers of the canterbury bell, and, as a rule, died shortly after."

W: T. (2717)

Patton, W: Hampton. The fertilization of the tulip. (Amer. entom., June 1880, v. 3, n. s., v. 1, p. 145, 25 cm.) (Gard. chronicle, 17 July 1880, n.s., v. 14, p. 76.)

Notice. (Amer. nat., Sept. 1880, v. 14, p. 669.)

Does not find nectar in the flowers of *tulipa gesneriana*, which are visited for pollen by species of *halictus*. *W: T.* (2718)

Peck, C: H. The black spruce. Read before the Albany institute, May 4, 1875. [Albany, 1875?] 21 p., 22×14, t 16×7.5.

Records the attacks, on *abies nigra*, of a species of *adelges* (p. 13), of *hylurgus rufipennis* and of *apate rufipennis* (p. 16-21). *W: T.* (2719)

Potonié, H: Ueber die Blüthenformen von *salvia pratensis*, L., und die Bedeutung der weiblichen Stöcke. (Sitzungsber. Ges. naturf. Freunde, Berlin, 15 June 1880, no. 6, p. 85-92, 3 fig.)

Crit. rev., by H. Müller, with same title. (Bot. Zeitung, 29 Oct. 1880, v. 38, c. 749-750, 21 cm.)

Notes the gynodioicism of this and two other species of *salvia;* states his views concerning their value in securing cross-fertilization by aid of insects. *W: T.* (2720)

Riley, C: Valentine. [Capture of moths by *physianthus albens*.] (Trans. acad. sci. St. Louis, 1 Dec. 1873, v. 3, Proc., p. 115, 8 cm.)

Records the capture of a number of *noctuidae* and of *sphingidae*, especially *deilephila lineata*. *Nerium oleander* and *oenothera grandiflora* are said to capture sphinx moths in Europe. *W: T.* (2721)

Riley, C: Valentine. Descriptions and natural history of two insects which brave the dangers of *sarracenia variolaris*. (Trans. acad. sci. St. Louis, 1873, v. 3, p. 235-240, 2 fig.)

The insects are *xanthoptera semicrocea* Guen., and *sarcophaga sarraceniae* n. sp. *W: T.* (2722)

Riley, C: Valentine. Supplementary notes on *pronuba yuccasella*. (Trans. acad. sci. St. Louis, 1873, v. 3, p. 178-180, 1 fig.)

Describes the pupa and pupation, and discusses the range of the insect. *W: T.* (2723)

Rust, J. Bees in the peach house. (Gard. chronicle, 7 Feb. 1880, n. s., v. 13, p. 182, 8 cm.)

Bees are profitably kept in forcing houses for peach, etc., to effect the pollination of the flowers. *W: T.* (2724)

Ryder, J: A. Honey glands on *catalpa* leaves. (Proc. acad. nat. sci. Phil., 10 June 1879, v. 31, p. 161, 8 cm.)

Describes the secreting organs. Their nectar is attractive to ants. *W: T.* (2725)

Savi, Pietro. Osservazioni sugli organi sessuali del genere *stapelia*. (Memorie della r. accad. delle sci. di Torino, 18 Jan. 1835, v. 38, p. 189-208, 1 pl.)

A comparative study of the flowers. Pollination is effected by flies which visit the flowers and even oviposit in them. *W: T.* (2726)

Sensitive organs in the flowers of asclepiads. (Pop. sci. rev., Jan. 1879, v. 18, n. s., v. 3, p. 89, 6 cm.)

Abstract of J. G. Hunt's "Sensitive organs in *stapelia*" (Proc. acad. nat. sci. Phil., 27 Aug. 1878, v. 30, p. 292-293) [Rec., 2681]. *W: T.* (2727)

Sheppard, J. Bees and fruit blossoms. (Gard. chronicle, 29 Mar. 1879, n. s., v. 11, p. 408, 14 cm.)

States that bees in forcing houses are injurious by collecting pollen needed for fertilization. *W: T.* (2728)

Smith, James E: An introduction to physiological and systematical botany. 3d ed. Lond., Longman [etc.], 1814. 407 p., 22.5×13.5, t 15.5×8.5; 15 pl.

Shows (p. 256-258) how insects aid in the pollination of *ficus* and of *aristolochia clematitis*, and remarks on their floral activity. Considers (p. 148-151) the insectivorous habits of *sarracenia*, *nepenthes*, *dionaea* and *drosera*. Discusses (p. 263-265) galls due to insects. *W: T.* (2729)

[**Spider-bite**.] (Springfield [Mass.] d. republican, 26 Aug. 1880, p. 6, col. 5, 1 cm.)

An accident insurance company pays a man ten dollars a week because of injuries from a spider's bite. *G: D.* (2730)

Stàhala, Johannes. Der Entscheidungskampf wegen der Leistungsfähigkeit der cyprischen Biene. (Deutsch. Bienenfreund, 15 Jan. 1881, jahrg. 17, p. 23-28.)

Defends the raising of Cyprian bees against the objections in N. N's "Besitzt die cyprische Biene entschiedene Vorzüge?" (*op. cit.*, 15 June 1880, jahrg. 16, p. 181) [Rec., 2579]. *G: D.* (2731)

Stecker, Anton. Ueber die Rückbildung von Sehorganen bei den Arachniden. (Morphologisches Jahrbuch . . . Gegenbaur, 1878, v. 4, p. 279-287, pl. 16.)

In some specimens of *chernes cimicoides* the eye-spot is wanting and the optic nerves are rudimentary. This is attributed to retrograde development. Other points discussed. *H: W. T.* (2732)

Strecker, Herman. On a lately described species of *limenitis*. (Can. entom., Feb. 1881, v. 13, p. 29-30.)

Limenitis eros, Edw. (Can. entom., Dec. 1880, v. 12, p. 246-251) [Rec., 2292] was previously described by H. Strecker (Butterflies and moths of North America [Rec., 996], p. 143) as *l. misippus* var. a *floridensis;* reasons why the author still regards it to be a variety of *l. misippus*. *G: D.* (2733)

Thomas, Cyrus. Notes on orthoptera. (Can. entom., Nov. 1880, v. 12, p. 221-224.)

Notes on *oedipoda obliterata* (new species), *o. carolina*, *anabrus haldemanii*, *cratypedes putnami* and *hippiscus lineatus*. *G: D.* (2734)

Thomson, G: M. The flowering plants of New Zealand, and their relation to the insect fauna. (Trans. bot. soc., Edinburgh, 8 July 1880, v. 14, p. 91-105.)

The author does not entirely agree with the statements in A. R. Wallace's "Geographical distribution of animals" as to the exceptional rarity of fragrant and nectariferous flowers and of flower-frequenting insects in New Zealand. He states that there are 18 butterflies, many hundred species of moths—all rich in individuals —1300 coleoptera, 10 bees and "many other families [of hymenoptera] fairly-well represented," many flower-visiting heteroptera, and 90-95 diptera. Neuroptera, orthoptera and homoptera are omitted, as not bearing on the subject. Of 262 species belonging to 132 genera of plants —not including the lower endogens—139 have conspicuous flowers, nectar was found in 99, and 64 were noted as fragrant. 110 are absolutely incapable of self-fertilization, 63 of these being entomophilous; of the remaining 152, 96 are more or less dependent on insects, 8 are fertilized by birds. From his observations, the writer seems inclined to believe that most diptera are attracted to flowers chiefly by smell, while most coleoptera, lepidoptera and hymenoptera are attracted by sight. *W: T.* (2735)

Tincture of insect powder. ("Scientific american.") (New remedies, Dec. 1880, v. 9, p. 375, 3 cm.)

Tincture of Persian insect powder [*pyrethrum*] recommended to be used with an atomizer to kill flies and other insects. *G: D.* (2736)

Trelease, W: Action of bees toward *impatiens fulva*. (Bull. Torrey bot. club, Feb. 1880, v. 7, p. 20-21, 11 cm.)

Notes the behavior of a hive bee [*apis mellifica*] while visiting flowers whose nectaries had not been perforated previously by some other insect, and while visiting perforated flowers. *W: T.* (2737)

Trelease, W: Dr. Hermann Müller's Alpenblumen. (Psyche, Feb. [July] 1881, v. 3, p. 175, 25 cm.)

Rev. of H. Müller's "Alpenblumen, ihre Befruchtung durch Insekten, und ihre Anpassungen an dieselben" [Rec., 2175]. *W: T.* (2738)

Trelease, W: The fertilization of *salvia splendens* by birds. (Amer. nat., April 1881, v. 15, p. 265-269, 1 fig.)

Describes the mode of fertilization of some species of *salvia* by insects. *G: D.* (2739)

Trelease, W: The fertilization of *scrophularia*. (Bull. Torrey bot. club, Dec. 1881, v. 8, p. 133-140, 4 figs.)

Shows how crossing is effected by insects, chiefly wasps. Appended is a list of papers in which the pollination of *scrophularia* is discussed. *W: T.* (2740)

Trelease, W: Nectar, its nature, occurrence and uses [Rec., 2475].

Notice. (Amer. nat., Sept. 1880, v. 14, p. 669.)

Rev., with full title. (Amer. nat., Nov. 1880, v. 14, p. 803.) *G: D.* (2741)

Treviranus, Ludolph Christian. Nachträgliche Bemerkungen über die Befruchtung einiger Orchideen. (Bot. Zeitung, 7 Aug. 1863, v. 21, p. 241-243.)

Rev., entitled "Dimorphic flowers." (Nat. hist. rev., Apr. 1864, v. 4, no. 14, p. 243-248.)

Considers the floral structure of several species of *ophrys*, *orchis* and *epipactis*, as adapted to self-fertilization, or to crossing by aid of insects. *W: T.* (2742)

[**United States entomological commission**, Notice of the work of the.] (Springfield [Mass.] d. republican, 8 Oct. 1880, p. 4, col. 4, 3 cm.) *G: D.* (2743)

Wallace, Alfred Russel. Bees killed by *tritoma*. (Nature, 15 Nov. 1877, v. 17, p. 45, 5 cm.)

States that hive bees [*apis mellifica*] become wedged in the flowers of this plant, while after nectar, and are unable to escape. *W: T.* (2744)

Wax in Chili. (Journ. applied sci., April 1881, v. 12, p. 51, 5 cm.)

Statistics of bees and their wax-production in Chili. *G: D.* (2745)

Webster, Francis M. Cecropia cocoons punctured by the hairy woodpecker. (Amer. nat., March 1881, v. 15, p. 241-242.) (Separate [General notes; entomology], from Amer. nat., Mar. 1881, p. 241-242.)

Cocoons of *attacus cecropia* are picked open and the pupa eaten by *picus villosus*. *G: D.* (2746)

Wilson, Alexander Stephen. Observations and experiments on ergot. (Trans. bot. soc. Edinburgh, 7 Dec. 1875, v. 12, p. 418-434, pl. 5.)

States (p. 428-429) that the drops of "honey-dew" containing the *sphacelia*-spores are attractive to about six species of *diptera*. House-flies died after drinking the fluid. *W: T.* (2747)

White, F. Buchanan. The influence of insect agency in the distribution of plants. (Journ. of botany, Jan. 1873, v. 11, n. s., v. 2, p. 11-13.)

Discusses the influence of *sphinx convolvuli* in the pollination of *convolvulus sepium*; and of *dianthoecia* in that of *silene* and *lychnis*, upon the green seeds of which the larvae feed. Believes insects to be the agents in the production of hybrids in *carduus*. Notes some of the flowers more especially frequented by *meligethes*. Considers the value of the thoracic crest of many nocturnal moths, in retaining pollen of the flowers they visit and cross-fertilize. *W: T.* (2748)

ENTOMOLOGICAL ITEMS.

THE UNITED STATES ENTOMOLOGICAL COMMISSION has issued twelve circulars of inquiry, seven bulletins, and two reports. Bulletins nos. 1 and 2, on the Rocky Mountain locust [see Rec., 797, 798] were issued in May 1877; no. 3, on the cotton-worm, by Riley, in Feb. 1880; no 4, on the hessian-fly, by Packard [see Rec., 2207], in May 1880; no. 5, on the chinch-bug, by Thomas [see Rec., 2208], in March 1880; no 6, an index and supplement to Riley's nine reports as state entomologist of Missouri (1869-1877), by Riley, in July 1881; no. 7, a compilation on insects injurious to forest and shade trees, by Packard, in March 1882. The first report, for 1877, was issued in June 1878; the second, for 1878-1879, in March 1881. A third report is completed in manuscript, but not printed, and a revised edition of Bulletin no. 3 is in the press as a fourth report. The editions of all these published works, except Bulletins nos. 6 and 7, are exhausted.

BY MODIFICATION of the Constitution of the Cambridge Entomological Club, adopted at the meeting of 10 March 1882, "those members only who are subject to the payment of fees shall be entitled to vote or hold office." Article 1 of the By-laws was made, at the same time, to read as follows: "The Club shall consist of active and associate members. Active members are those who live near enough to Cambridge to attend the meetings of the Club, and return home the same evening, together with those who, living beyond these limits, signify their willingness to be assessed and participate in the business of the Club. All others shall be known as associate members. The entrance fee shall be two dollars, and an assessment of the same amount shall be due January first of each year from each active member. The President and Treasurer may, at their discretion, exempt a member from assessment."

[Copies of the Constitution and By-Laws, as published in *Psyche advertiser*, Sept.-Oct. 1877, p. 5-6, will be sent to any member, on application.]

SOCIETY MEETINGS.

THE REGULAR Meetings of the Cambridge Entomological Club will be held at 7.45 p.m., on the days following:—

14 Oct. 1881.
11 Nov. "
9 Dec. "
13 Jan. 1882.
10 Feb. "
10 Mar. 1882.
14 Apr. "
12 May "
9 June "

B: PICKMAN MANN, *Secretary.*

THE REGULAR meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following:—

26 Oct. 1881.
23 Nov. "
28 Dec. "
25 Jan. 1882.
22 Feb. 1882.
22 Mar. "
26 Apr. "
24 May "

B: PICKMAN MANN, *Secretary.*

THE REGULAR meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following:—

14 Oct. 1881.
11 Nov. "
9 Dec. "
13 Jan. 1882.
10 Feb. "
10 Mar. 1882.
14 Apr. "
12 May "
9 June "

JAMES H. RIDINGS, *Recorder.*

THE SEMI-ANNUAL meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following:—

12 Dec. 1881.
12 June 1882.

JAMES H. RIDINGS, *Rec. Sec'y.*

THE REGULAR monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal Que., Canada, on the days following:—

6 Sept. 1881.
4 Oct. "
1 Nov. "
6 Dec. "
3 Jan. 1882.
7 Feb. "
7 Mar. "
4 Apr. "

G: H. BOWLES, *Secretary.*

PRIZE ESSAYS.

DUE 15 OCT. 1882.—Life-histories of *Sclerostoma syngamus* and of *Strongilus pergracilis.* See PSYCHE, v. 3, p. 59.

ADVERTISEMENTS should reach the editors by the 10th of the month preceding the one in which they are to appear.

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J. HENRY COMSTOCK,
Department of Entomology,
The Cornell University,
Ithaca, N. Y.

No. 94 was issued 24 May 1882.

A. Hagen

PSYCHE,

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

[Established in 1874.]

EDITED BY

G: DIMMOCK, *Cambridge, Mass.;* B: PICKMAN MANN, *Washington, D. C.;*
ALBERT J: COOK, *Lansing, Mich.;* CLIFFORD CHASE EATON, *Cambridge,*
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Vol. 3. No. 97.

MAY 1882.

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PSYCHE.

MUSCA DOMESTICA LINN. VERSUS *VESPA OCCIDENTALIS* CRESSON.

BY FRANCIS HUNTINGTON SNOW, LAWRENCE, KANSAS.

During the collecting expeditions of his summer vacations the writer has had frequent occasions to note the misleading nature of the vernacular name of the common house-fly. It was at first a matter of surprise to find that wherever our camp was made — whether on the broad plains of western Kansas, many miles from the nearest human abode, or in some secluded cañon of the Rocky mountains but rarely visited by hunters and tourists — the locality was already occupied in full force by this insect so commonly supposed to be exclusively found in and around the permanent dwellings of the human race. In such uninhabited localities the tents would be pitched but a few hours before they would become disagreeably filled with flies, all of which, with the exception of an occasional *Stomoxys*, were unmistakably *Musca domestica* Linn.

While camping in Santa Fé cañon, N. Mexico, in August, 1880, this plague of flies seemed about to be unusually formidable. On the very first night the lower surfaces of the roofs and ridge-poles of the tents were fairly blackened by the immense multitudes of dipterous pests. The next morning it was observed, somewhat to the alarm of the women and children of the party, that large numbers of so-called yellow-jackets (*Vespa occidentalis* Cr.) were entering the tents. For some time it was supposed that the object of the new comers was to forage for sugar and other camp supplies. But before night it was noticed that the numbers of flies in the tents had been perceptibly reduced, and on the second morning it was discovered that the wasps were intent on the acceptable task of removing our troublesome guests. There were generally as many as forty or fifty wasps in each tent at once, and each wasp was observed on leaving the tent to be carrying out the body of a fly, not for burial nor as food for its captors, but for storage in the nests of the wasps and undoubtedly as food for their young. Each captured fly, before removal from the tents, was deprived of its wings and legs, and on several mornings we were awakened from our slumbers by these severed members dropping upon our faces. The wasps were unremitting in their labors from daylight to dusk, and in four or five days the flies had ceased to be troublesome by their numbers, the wasps having gained upon them so as to dispose of them almost as rapidly as they entered the tents. Occasionally a specimen of *Vespa maculata* Linn. was observed cooperating with *V. occidentalis* Cr. in the removal of the flies.

ASYMMETRY OF THE NERVOUS SYSTEM IN THE LARVA OF *HARPYIA.*

BY ANNA KATHERINA DIMMOCK, CAMBRIDGE, MASS.

NOTHING has been published in regard to asymmetry of the nervous system of arthropoda, as far as I have been able to ascertain.

In dissecting a number of the larvae of *Harpyia* (*Bombyx*) *vinula*, I found that the nervous system, instead of extending in a direct line in the ventral region of the larva, as is common in insect larvae, curved outward laterally between the first and second thoracic ganglia, as seen between *c* and *d* in figure 6. This curving, which was toward the left in six larvae examined, is to avoid interference with the duct from a sac, or gland, which opens out between the first and second thoracic ganglia. This gland, represented in the figure by a dotted line, secretes a liquid, said to contain salicylic acid, which the larva ejects, as a means of defense, when disturbed. The duct of this gland opens by a transverse cleft, figured by Müller,[1] on the ventral side of the first segment posterior to the head. Further details in regard to this gland are unnecessary as a good description of it has been given already by Rengger.[2]

In the earlier stages of the larvae of *Harpyia*, the nervous system turns considerably out of the direct line, in order to allow the duct of the gland to pass, as can be seen in figure 6, which represents the condition in a half-grown larva; but, in the full-grown or nearly full-grown larvae, the nervous system is nearly straight, altho it is still distinctly unsymmetrical. This lessening of asymmetry, as the larva grows, is due to the duct being somewhat smaller in larger larvae, in proportion to the size of the larva, thus allowing the nervous system to settle back, more or less, into its normal position.

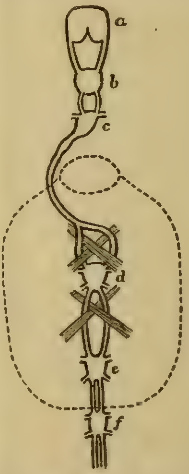

Fig. 6.—View of anterior portion of central nervous system of larva of *Harpyia vinula* as seen from above: *a*, supraoesophageal ganglion; *b*, infraoesophageal ganglion; *c*, *d*, and *e*, thoracic ganglia; *f*, first abdominal ganglion. Dotted line represents gland mentioned in text. Enlarged 6 times.

The commissures connecting the first and second thoracic ganglia (*c* and *d*) are united three-fourths of their entire length, separating at the posterior fourth to admit the passage of muscles which are described later. The united commissures are slightly enlarged posterior to the first thoracic ganglion (*c*).

---

[1] O. F. Müller. Pile-Larven med dobbelt Hale, og dens Phalaene . . . Kjobenhavn, 1772, pl. 2, fig. 3, *d*.

[2] J. R. Rengger. Physiologische Untersuchungen über die thierische Haushaltung der Insecten. Tübingen, 1817, p. 35-36.

The muscles which cross each other between the commissures connecting the first and second and second and third thoracic ganglia are generally found in lepidopterous larvae, and serve to hold the second and third thoracic ganglia in the median line. The mode in which these muscles cross each other and interlace the commissures, as seen in the figure, is the same between the second and third as between the first and second thoracic ganglia. This mode of interlacing of the muscles and commissures is exactly the same in the larva of *Sphinx ocellata* as it is in that of *Harpyia*.

The kind of asymmetry existing in the nervous system of the larva of *Harpyia* has been found, as far as I know, in no other arthropod, but, upon suggestion of Professor Leuckart, of Leipzig, in whose laboratory I was studying when I discovered the asymmetry in the nervous system of the larva of *Harpyia*, I examined *Hirudo medicinalis*, the blood-leech, the nervous system of which has an analogous asymmetry. The genital organs are in such a position, in *Hirudo*, as to necessitate the pushing of the nervous system slightly to one side, near their outlet.

Of four specimens of *Hirudo* examined, two had the nervous system to the right and two to the left of the genital organs; but of six specimens of *Harpyia* dissected, all had the commissure between the first and second thoracic ganglia deflected toward the left.

Paris, France, 3 Dec. 1881.

NOTE ON *CATOGENUS RUFUS.*

BY GEORGE DIMMOCK, CAMBRIDGE, MASS.

In the winter of 1878-1879 I received, from Suffield, Conn., a lot of nearly full-grown larvae of *Elaphidion parallelum* in twigs of *Carya alba*. One of these larvae, in a portion of a twig split in two parts which were carefully and tightly held together by a rubber band, was reserved upon my writing-table for the purpose of taking notes on its transformations. This larva pupated in the early part of March, and was then in an apparently healthy condition.

A short time after the larva of *Elaphidion* had pupated, a small white larva made its appearance in the cavity of the wood, in which the pupa was confined. As the pupa seemed in no way injured I could not determine whether or not the larva had hatched from an egg within the pupa. This larva was shown at the 58th meeting of the Cambridge entomological club. It was then very small and had the appearance of being lepidopterous. Supposing it to be the larva of some kind of museum pest that had, in a mysterious way, gained access to the pupa, I took no description or figure of it. It grew slowly, devouring the pupa of the *Elaphidion*, until about 20 May, when it pupated, having eaten all but a few shreds of the pupa of the *Elaphidion*. The new pupa, which is represented in fig. 7, was that of a coleopteron, and from it emerged, about 1 July, *Catogenus rufus*.

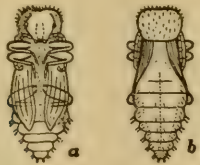

Fig. 7.—Pupa of *Catogenus rufus*. *a*, ventral view. *b*, dorsal view.

The pupa of *Elaphidion* was 15.5 mm. long, and the pupa of *Catogenus* was 10 mm. long. The pupa of the latter weighed about one-fifth as much as that of the former; therefore there must have been a remarkable economy in the digestive processes of the larva of *Catogenus* to enable it to utilize, in the manufacture of new tissues, one-fifth of the material which it devoured. No such power of economical assimilation can, of course, be found in the case of herbivorous larvae, nor have I been able to find any such case recorded for carnivorous larvae. It is surely not the case with the different species of larvae infesting collections, for often a single larva of *Anthrenus* will devour dried specimens many times as heavy as the *Anthrenus* it is to produce.

Paris, France, 21 Dec. 1881.

NOTE ON *DEILEPHILA LINEATA*, FABR.

BY HENRY WEBSTER PARKER, GRINNELL, IOWA.

Last summer (1880), *Deilephila lineata*, Fabr. was the most conspicuously common moth in the vicinity of Grinnell, Iowa, especially during the month of August. At all hours of the day, one or more might be seen hovering over nearly every flower of the innumerable weeds, mostly thistles and *Helianthus*, by the roadsides. In places, the moths might be estimated by the hundreds. At Amherst, Mass. I captured this species, repeatedly, at twilight of the evening. Harris speaks of it as a morning sphinx. Does he mean early morning only? Where it is comparatively scarce, is it mostly crepuscular, and, where common, does it gain courage, and is it even obliged to seek its food at all hours of the day, the supply of food being small in proportion to the number of moths?

PSYCHE.

CAMBRIDGE, MASS., MAY 1882.

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Works on subjects not related to entomology will not be reviewed in PSYCHE.

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CORRESPONDENCE.

BARON C. R. Osten Sacken, in a letter dated at Heidelburg, 9 June 1882, calls attention to observations which he made many years ago, during his residence in Washington. D. C., and which are similar to those recorded by Mr. W: Trelease in the February numero of PSYCHE, in an article entitled "Unusual care of ants for aphides."

Baron Osten Sacken has obligingly furnished the following translation of a short article on the subject, which he published in the *Stettiner Entomologische Zeitung*, in 1862 (p. 127-128).

ANTS AND APHIDES.

Huber made the observation that certain ants erect a kind of shelter for the aphides which they use as milch cows, fastening it to the twig or stem upon which these plant-suckers are living. I do not remember the details of his observations, and have no copy of his work within reach. As far as I know, the observation has not been repeated since; at least when Kirby and Spence speak of it, it is evidently on Huber's authority. I hope, for this reason, that two similar observations, which I made in the United States, may be of some scientific interest.

On a horizontal twig of a juniper (*J. virginiana*), about five feet from the ground, I observed a colony of a species of *Lachnus*. A small reddish ant with a brown abdomen was diligently working at a tube-shaped structure of a soft, grayish brown, felt-like material, enclosing the twig in a kind of sheath. The material probably consisted of short fibres of liber closely packed together; it had a pitchy smell, burnt well, the smoke having the same smell, but stronger. The structure was about an inch long and one-third of an inch in diameter.

The second case observed by me was near the Berkeley Springs, in Virginia. A black ant had built a globular structure of a sandy material, of about an inch and a half in diameter, around the stem of an *Asclepias*, which was closely packed with aphides. Although the sand was sufficiently mixed with clay to have the necessary consistence, and although several leaf-stalks served as supports, the structure was so brittle that I did not succeed in bringing it home.

XYLOCOPA AND MEGACHILE CUTTING FLOWERS.

Miss Mary Esther Murtfeldt, of Kirkwood, Mo., writes, 22 June 1882, "I have repeatedly verified your observations on '*Xylocopa* perforating a corolla tube' in no. 93.

This great bee is a serious nuisance in our flower garden. It is especially destructive to the delicate blossoms of *Plumbago capensis*, which are salver-shaped with long, slender tubes. I have seen a single insect slit up, in the manner you describe, as many as fifty blossoms in about ten minutes, very soon ruining the appearance of the plant. It also splits the tubes of the blossoms of the honeysuckles in the same way.

We are also much annoyed by the depredations of a *Megachile* which seems to have a very refined color-sense, cutting the lining for its cells from our choicest and most delicately tinted flowers, being very partial to pink, lavender and pale blues and purples, while it seldom or never touches scarlet or yellow. Plumbagos and pink geraniums are sometimes almost destroyed by it."

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [ ], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

Corrections of errors and notices of omissions are solicited.

"**Buffalo** gnat" of the Mississippi valley (The). (Sci. amer., 20 May 1882, v. 46, p. 309, col. 3, 5 cm.)

Notes on a species of *simulium* and means to use against it. *G: D.* (2749)

Crow (The). (Sci. amer., 8 April 1882, v. 46, p. 216, col. 2, 10 cm.)

Defends *corvus americanus* because of its insectivorous habits. *G: D.* (2750)

Delpino, Federico. Nettarii estranuziali. (Rivista botanica, 1880, p. 23-24.)

Abstract of W: Trelease's "Nectar, its nature, occurrence and uses" ... [Rec., 2475]. *W: T.* (2751)

Des Vaulx, J. P. Plaisirs et profits de l'éleveur d'abeilles. Deuxième édition. Lille et Paris, J. Lefort, 1877. t.-p. cover, 180 p. 18 × 12, t 12.5 × 7.4. pap. 1 fr. 50 c.

Popular general work on apiculture. *G: D.* (2752)

Dilar in North America. (Amer. nat., Oct. 1881, v. 15, p. 822.)

Note on *dilar americanus* *G: D.* (2753)

Do bees injure grapes? (Sci. amer., 25 Feb. 1882, v. 46, p. 121, col 3, 4 cm.)

Bees, it is decided, do not puncture the skin of grapes. *G: D.* (2754)

Domestic silk growing. (Sci. amer., 11 Feb. 1882, v. 46, p. 84, col. 2-3, 42 cm.)

Notice of the first exhibition of the Women's Silk Culture Association, in Philadelphia; statistics on silk culture. *G: D.* (2755)

Double hybrid worm-proof cotton. (Sci. amer., 7 Jan. 1882, v. 46, p. 6, col. 3, 5 cm.)

Notice of a variety of cotton plant said to resist the attacks of worms. *G: D.* (2756)

Edwards, W: H: Habits of butterflies. (Amer. nat., Feb. 1882, v. 16, p. 122-123.)

On use of odor of *heliconia charitonia* and on the broods of *argynnis myrina*. Paper read at the Cincinnati (1881) meeting of the Amer. assoc. advanc. sci. *G: D.* (2757)

Emmett, Jane. Bees. (Gard. chronicle, 7 Nov. 1857, p. 757, 9 cm.)

Records the perforation of calyx and corolla of "the common red *salvia*" [*s. splendens?*], by *bombus*; and notes the curious behavior of *apis mellifica* when given spurs of the double columbine [*aquilegia*]. *W: T.* (2758)

Ernst, A. Fertilization of *coboea penduliflora* [Rec., 2395].

Notice. (Amer. nat., Sept. 1880, v. 14, p. 669.)

Crit. rev. of notice, by A. Ernst, in his "The lac insect" (Amer. nat., Mar. 1881, v. 15, p. 235) [Rec., 2760]. *G: D.* (2759)

Ernst, A. The lac insect. (Amer. nat., March 1881, v. 15, p. 235.)

Additions to J. M. Stillman's "On the origin of the lac" (Amer. nat., Nov. 1880, v. 14, p. 782-787) [Rec., 2792], and crit. rev. of the notice of author's "Fertilization of *coboea penduliflora*" (Nature, 17 June 1880, v. 22, p. 148-149) [Rec., 2395]. *G: D.* (2760)

Farrer, T. H. On the manner of fertilization of the scarlet runner and blue *lobelia*. (Ann. and mag. nat. hist., Oct. 1868, ser. 4, v. 2, p. 255-263; 2 fig.)

Shows the adaptation of the flowers of *phaseolus* and *lobelia* to crossing by insect agency, and notes the behavior of insects while visiting them. Observations on the floral structure of *campanula* and *jasione* are added. *W: T.* (2761)

Fuller, Andrew S., *see* BASKET WORM (The) ... [Rec., 2220].

Gibson, W: Hamilton. Among our footprints. (Harper's new mo. mag., Dec. 1881, v. 64, p. 65-82, 16 fig.)

A popular article on natural history. The habits of a number of insects are described. The pollination of *asclepias* by *apis mellifica* and *bombus*, and the occasional death of both insects from the encumbrance of too many pollinia, are noted. A very good account of the cross-fertilization of *habenaria psycodes* by *sesia* is given. *W: T.* (2762)

Gray, Asa, *see* PACKARD, A. S., *jr.*, Moths entrapped by an asclepiad plant ... [Rec., 1671].

Griffith, H. G. Carnivorous habits of *microcentrus retinervis*. (Amer. nat., May 1882, v. 16, p. 408.)

M. retinervis eat *megilla maculata*. *G: D.* (2763)

Heimerl, Anton. Ueber die Beziehungen zwischen Blumen und Insecten. (Wiener illustrirte Garten-Zeitung, 1881, jahrg. 6: Jan., p. 1-3; Feb., p. 49-54.)

Discusses the relative value of cross- and self-fertilization in plants, and shows how the former is secured by aid of insects: in *lilium martagon* by *macroglossa stellatarum*, in *salvia pratensis* and *linaria vulgaris* by *bombus*. *W: T.* (2764)

Hercules beetle (The). (Sci. amer., 4 March 1882, v. 46, p. 135, col. 1, 23 cm.)

Notes on habits of, and figure of *scarabaeus hercules*. From *La nature*. *G: D.* (2765)

Hildebrand, Friedrich. Experimente zur Dichogamie und zum Dimorphismus. (Bot. Zeitung, 1865, v. 23: 6 Jan., p. 1-6; 13 Jan. p. 13-15; 27 Jan. p. 36, 3 cm.)

Describes the structure of the flowers of *geranium pratense*, *digitalis purpurea* and *pulmonaria officinalis*, noting the behavior of insects when visiting them, and giving the results of experiments on their artificial fertilization. *W: T.* (2766)

Hildebrand, Friedrich. F. Delpino's Weitere Beobachtungen über die Dichogamie im Pflanzenreich, mit Zusätzen und Illustrationen. (Bot. Zeitung, 1870: 16 Sept., c. 585-594; 23 Sept., c. 601-609; 30 Sept., c. 617-625; 7 Oct., c. 633-641; 14 Oct., c. 649-659; 21 Oct., c. 665-675, pl. 10.)

Translation of the greater part of F. Delpino's "Ulteriori osservazioni sulla dicogamia . . . Parte 1a [Rec., 2391], with comments. The article is illustrated by a lithographic plate of 30 good figures by the translator. *W: T.* (2767)

Hoffmann, H. Zur Kenntniss der Gartenbohnen. (Bot. Zeitung, 1874, v. 32: 1 May, c. 273-283; 8 May, c. 289-302, pl. 5.)

Experiments on the variation induced in *phaseolus multiflorus* and *ph. vulgaris* by crossing showed that both species are self-fertile, the latter to a greater degree than the former. Experiments in artificial crossing of varieties gave chiefly negative results, from which the writer concludes that crossing is impossible, or at least very doubtful. Reference is made to the literature on insect-fertilization of the species of *phaseolus* (c. 295-296). *W: T.* (2768)

Howard, Leland O. Strange habits of *metapodius femoratus* Fab. (Amer. nat., July 1882, v. 16, p. 597-598.)

M. femoratus hangs up the empty skins of larvae of *leucania unipuncta*, from which it has sucked the juices, on the crotches of the stems of may-weed [*maruta cotula*]. *G: D.* (2769)

How to get rid of water bugs. (Sci. amer., 1 April 1882, v. 46, p. 193, col. 3, 3 cm.)

Recommends equal parts of powdered borax and sugar for water bugs [*ectobia germanica*]. *G: D.* (2770)

Kabsch, W. Anatomische und physiologische Beobachtungen über die Reizbarkeit der Geschlechtsorgane. (Bot. Zeitung, 1861, v. 19: 25 Jan., p. 25-29; 1 Feb., p. 33-37, pl. 1.)

Considers the irritable organs of a number of genera. In the *cynareae* protandry necessitates the aid of insects or other agents in fertilization. *W: T.* (2771)

Kidder, J. H. Note on the first insect from Wrangell Island. (Amer. nat., May 1882, v. 16, p. 408-409.)

An undescribed species of *erigone* and a larva, doubtfully lepidopterous, from Wrangell Island. *G: D.* (2772)

Lac. (Sci. amer., 8 April 1882, v. 46, p. 217, col. 1-3, 83 cm.)

General notes on lac; its source (*coccus lacca*), qualities, chemical constitution, mode of preparation, technical uses, employment as medicine. *G: D.* (2773)

Locusts in Angora. ("London [Engl.] telegraph" . . .) (Sci. amer., 20 May 1882, v. 46, p. 310-311, 22 cm.)

Notes on means attempted to destroy the locusts in Angora, Asia Minor. *G: D.* (2774)

Locust probabilities for 1882. (Amer. nat., Feb. 1882, v. 16, p. 153.

Notes on the locusts of the western United States, from letter by Lawrence Bruner. *G: D.* (2775)

Lubbock, J: "Blumen und Insecten in ihrer Wechselbeziehung dargestellt. Nach der 2e Auflage. Berl., Bornträger, 1877. 8vo."

Rev., by [Ernst] K[rause]. (Kosmos, June 1877, v. 1, p. 275, 18 cm.)

Germ. tr., by A. Passow, of Lubbock's "On British wild flowers considered in relation to insects" . . . [Rec., 2528]. *W: T.* (2776)

Mégnin, P. Les parasites et les maladies parasitaires chez l'homme, les animaux domestiques et les animaux sauvages avec lesquels ils peuvent être en contact. Insectes, arachnides, crustacés. Avec 65 figures dans le texte et un atlas de 26 planches dessinées par l'auteur. Texte, Paris, G. Masson, 1880. t.-p. cover, [6+] 478 p. 23×14, t 17×9.5. il. Pap., with atlas, 20 fr.

Atlas. t.-p. cover, [4 p.], 26 pl., each with p. of explanations. 23×15.

Crit. rev. (Bericht . . . der Entom., 1879, p. 7, 64-65, 69.)

General work on the arthropoda parasitic on man and domestic animals: p. 6-51, diptera; p. 52-56, hemiptera; p. 57-71, aphaniptera and coleoptera, including here the *pulicidae*, and *platypsyllidae*; p. 72-104, "epizoïques," including the *pediculidae* and *mallophaga*; p. 105-439, acarina: p. 440-456, crustacea; p. 457-459, addenda, errata, etc.; p. 460-478, alphabetic and systematic index. Diseases caused by parasites, and remedies for them; general notes accompany the descriptions of the parasites. All the figures in the atlas are of acarina. *G: D.* (2777)

Miller, W: Bees as fertilizing agents. (Gard. chronicle, 1 Feb. 1879, n. s., v. 11, p. 138-139.)

States that bees are profitably introduced into peach houses to effect pollination of the flowers. *W: T.* (2778)

Mimicry in fungi. (Amer. nat., Jan. 1882, v. 16, p. 42.)

From *Grevillea*. Fungi not rarely imitate vegetable, animal, or excrementitious substances, either as regards external appearance or as regards odor, so as to attract insects. *G: D.* (2779)

Moore, S. Le M. Notes on Mascarene orchidology. (Journ. of botany, 1876, v. 14, n. s., v. 5, p. 289-292, pl. 181.)

Shows the methods for ensuring cross-fertilization in *angraecum* and its allies, in *listrostachys pescatoriana*, and in *cynorchis*. The visits of insects are not mentioned. *W: T.* (2780)

Müller, Hermann. The fertilization of alpine flowers. (Nature, 22 Jan. 1880, v. 21, p. 275, 15 cm.)

A tabulated statement of the visits of insects to flowers in the lowlands, at a moderate elevation, and above the timber line. *W: T.* (2781)

New insects to agriculture. (Amer. nat., Feb. 1882, v. 16, p. 151-152.)

Abstract of paper read by C. V. Riley at the Cincinnati (1881) meeting of the Amer. assoc. advanc. sci. General considerations on the appearance of insects injurious to agriculture, but previously unknown in an injurious capacity. *G: D.* (2782)

Oviposition of *prodoxus decipiens* (On the). (Amer. nat., Jan. 1882, v. 16, p. 62-63.)

Abstract of a paper read by C. V. Riley at the Cincinnati meeting of the Amer. assoc. advanc. sci. in 1881. *G: D.* (2783)

Peixotto, F. C. How silk is reeled in France. (Sci. amer., 10 June 1882, v. 46, p. 360-361, 58 cm.)

Describes silk-reeling in France. *G: D.* (2784)

Profits of silk culture (The). (Sci. amer., 4 March 1882, v. 46, p. 128, col. 2-3, 17 cm.)

Crit. rev. of "Silk raising at the south" [Rec., 2788]. *G: D.* (2785)

Riley, C: Valentine. Silk culture in the United States. (Sci. amer., 1 April 1882, v. 46, p. 193, col. 1-2, 73 cm.)

General notes on silk culture applicable to the United States. *G: D.* (2786)

Riley, C: Valentine. Successful management of the insects most destructive to the orange. (Sci. amer., 27 May 1882, v. 46, p. 335-336, 171 cm., 5 fig.)

Treats of the *coccidae* injurious to the orange, and of the insecticides used against them, especially of kerosene used in an emulsion with water. Figures stages of *mytilaspis pomicorticis*, *m. gloverii* and *m. citricola*. *G: D.* (2787)

Silk raising at the south. (Sci. amer., 11 Feb. 1882, v. 46, p. 88, col. 1-2, 41 cm.)

Crit. rev. entitled "Profits of silk culture." (Sci. amer., 4 March 1882, v. 46, p. 128, col. 2-3, 17 cm.)

From *Louisville* [Ky.] *courier journal*. Amount of care required in rearing silk-worms in the southern United States. *G: D.* (2788)

Six cents a piece for wasps. (Sci. amer., 18 March 1882, v. 46, p. 167, col. 2, 7 cm.)

On account of the destruction of fruit by wasps an English fruit-grower offers 3 d. each for queen wasps. Number of wasps in a nest. *G: D.* (2789)

Some curious bugs. (Sci. amer., 6 May 1882, v. 46, p. 279, col. 1-2, 49 cm., fig.)

General popular notes on hemiptera; figures a large Indian *belostoma*. From *La nature*. *G: D.* (2790)

Sprang, G: The fertilization of the trumpet-creeper. (Bot. gazette, Dec. 1881, v. 6, p. 302-303, 11 cm.)

Shows how cross-fertilization is effected by humming-birds. Notes the perforation of calyx and corolla by a "black ant," which feeds upon the nectar. *W: T.* (2791)

Stillman, J: M. On the origin of the lac. (Amer. nat., Nov. 1880, v. 14, p. 782-787.)

Contrary to the statement of several cyclopedias, lac is a product elaborated by *coccus*, and not an exudation from the tree on which it lives; reasons for this view drawn from *c. lacca* and from an analogous insect which produces Arizona lac. See also A. Ernst's "The lac insect" (Amer. nat., Mar. 1881, v. 15, p. 235) [Rec., 2760]. *G. D.* (2792)

Taylor, J. E. The geological antiquity of flowers and insects. (Pop. sci. rev., Jan. 1878, v. 17, n. s., v. 2, p. 36-52.)

Traces the cotemporaneous evolution of flowers and insects. *W: T.* (2793)

Threatening pest (A). (Sci. amer., 22 April 1882, v. 46, p. 248, col. 2, 7 cm.)

An insect, known as the Australian bug, does much damage to trees near Cape Town, South Africa. *G: D.* (2794)

Trelease, W: On the fertilization of *calamintha nepeta*. (Amer. nat., Jan. 1881, v. 15, p. 11-15, 2 fig.)

List of some of the insects aiding to fertilize *c. nepeta*. *G: D.* (2795)

Trelease, W: The fertilization of alpine flowers. (Bulletin Torrey bot. club, Feb. 1881, v. 8, p. 13-14, 25 cm.)

Review of H. Müller's "Alpenblumen, ihre Befruchtung..." [Rec., 2175]. *W: T.* (2796)

Wild bee hunting. ("N. Y. observer.") (Springfield [Mass.] d. republican, 26 Oct. 1880, p. 3, col. 1-2, 15 cm.)

How wild bees are traced to their home. *G: D.* (2797)

Women's silk culture association. (Sci. amer., 29 April 1882, v. 46, p. 258, col. 1, 5 cm.)

Brief notes on silk raised in America. *G: D.* (2798)

Wood, W. Martin. New variety of silk moth. (Sci. amer., 8 April 1882, v. 46, p. 215, col. 3, 18 cm.)

Notes on a hybrid of *saturnia yama-mai* and the Tusser moth [*antheraea paphia*]. *G: D.* (2799)

Young, C. A. How spiders fly. ("Boston journ. chem."...) (Sci. amer., 21 Jan. 1882, v. 46, p. 42, col. 2-3, 30 cm.)

Regards the "action of the sun's rays on the thread itself and its surrounding envelope of air" as the main cause of the buoyancy of the web which supports floating, or so-called flying, spiders. *G: D.* (2800)

ENTOMOLOGICAL ITEMS.

We are sorry to note the discontinuance of the *Science advocate*, which has been published at Atco, N. J.

Prof. K. L. Bramson of Ekaterinoslav, Russia, has sent to the Cambridge Entomological Club, a list of duplicate coleoptera, hymenoptera, diptera and lepidoptera, which he offers in exchange for North American lepidoptera. Members of the Club residing at a distance may see the list by sending prepayment of postage to the Secretary. Those who wish to exchange are requested to send lists of duplicates to Prof. Bramson.

The collection of insects belonging to the University of Kansas contains about 6000 species of coleoptera and 2000 of lepidoptera and 2000 of the remaining orders. Prof. F. H. Snow, who has charge of it, has donated to the University everything he has ever collected or obtained in exchange.

Dr. F. A. W. Thomas of Ohrdruf, Germany, has published in Just's *Botanischer Jahresbericht*, from year to year, reviews of the literature of plant-galls, since 1875 [*see* Rec., 1285]. The review for 1879 is noticed in the *American naturalist*, March 1882, v. 16, p. 246-247, by Dr. C: V. Riley, who says "the most important contribution of the year 1879 seems to have been L. Courchet's 'Étude sur les galles produites par les aphidiens.'"

The Ottawa field naturalists' club, organized in March 1879, of which James Fletcher is president and W: Hague Harrington is secretary, aims to promote in a systematic manner, the study of the natural history of Ottawa, Ontario. It will soon publish the third numero of its transactions. "Leaders" have been appointed in the several branches of natural history, to assist the members in the collection and determination of specimens. A prize is offered in each branch for the best collection of specimens and a special prize for the most important additions to any list already published in the club's transactions. The leaders in entomology are W. H. Harrington and J. B. Tyrell.

SOCIETY MEETINGS.

The regular Meetings of the Cambridge Entomological Club will be held at 7.45 p.m., on the days following:—

14 Oct. 1881.
11 Nov. "
9 Dec. "
13 Jan. 1882.
10 Feb. "
10 Mar. 1882.
14 Apr. "
12 May "
9 June "

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following: —

26 Oct. 1881.
23 Nov. "
28 Dec. "
25 Jan. 1882.
22 Feb. 1882.
22 Mar. "
26 Apr. "
24 May "

B: Pickman Mann, *Secretary.*

The regular meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following:—

14 Oct. 1881.
11 Nov. "
9 Dec. "
13 Jan. 1882.
10 Feb. "
10 Mar. 1882.
14 Apr. "
12 May "
9 June "

James H. Ridings, *Recorder.*

The semi-annual meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following:—

12 Dec. 1881.
12 June 1882.

James H. Ridings, *Rec. Sec'y.*

The regular monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following:—

6 Sept. 1881.
4 Oct. "
1 Nov. "
6 Dec. "
3 Jan. 1882.
7 Feb. "
7 Mar. "
4 Apr. "

G: H. Bowles, *Secretary.*

PRIZE ESSAYS.

Due 15 Oct. 1882.—Life-histories of *Sclerostoma syngamus* and of *Strongilus pergracilis.* See Psyche, v. 3, p. 59.

ADVERTISEMENTS should reach the editors by the 10th of the month preceding the one in which they are to appear.

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Department of Entomology,
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Vol. 3. No. 98.

JUNE 1882.

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Department of Entomology,
The Cornell University,
Ithaca, N. Y.

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Washington, D. C.

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A NEW MUSEUM PEST, *TROGODERMA TARSALE* MELS.

BY FRANCIS HUNTINGTON SNOW, LAWRENCE, KANSAS.

In Dr. Hagen's list of "Museum pests observed in Cambridge," published in the Proceedings of the Boston Society of Natural History, vol. 20, I find no mention of the above species, and in order that eastern collectors may guard against its introduction into their cabinets I give the following brief description of its larva and pupa.

LARVA.

Measurements, when full grown: length, exclusive of caudal hairs, 5.4 mm.; including caudal hairs, 8 mm.; breadth 1.6 mm.

Upper dermal surface reddish brown; lower surface vitreous white; entire surface covered with short, soft, yellowish brown hairs; each stigmatic orifice surrounded by a stellate tuft of longer setose hairs, of variable length and of the same color as the general hairy covering. The upper surface of the last three segments is entirely concealed by a dense mass of short, erect, dark brown hairs so nearly equal in length as to present the appearance of having been cut off with shears, like the bristles of a very compact brush. The sides of the upper surface of the two preceding segments have a similar covering. The two caudal appendages, which attain one half the length of the body and are noticeably separated when the larva is in motion, often appear to the eye to consist each of a single, stout, elongated bristle, but, under the microscope, are seen to be composed in each case of from twenty to twenty-five separate hairs.

Larvae infesting cabinet specimens in the autumn remain in their hosts during late autumn and winter, apparently in an inactive condition. From 1 March to 1 April, according to the season, they begin to transform into the pupal state, for which purpose, unless the infested specimen is of large size, they come forth from their places of concealment and are easily observed and destroyed.

PUPA.

Length, 4 mm.; breadth, 2 mm.

Enclosed within the larval skin, and visible only from above, where the larval skin is longitudinally split open along the median dorsal line from head to anal segment. Abruptly narrows to a point at the anal extremity. Removed from larval skin, the entire surface of the pupa is seen to be covered with short, soft, light yellowish brown hairs, except at the centre of dorsal surface which contains three minute transverse incisions or furrows. The anterior margin of each furrow is straight while the posterior margin is curved. Examined under the microscope, both margins of each incision are seen to be minutely dentate, but the teeth of the posterior margins are more prominent than those of the anterior margins. The incisions being in the outer layer of the skin only, these minute teeth may be of use in fixing the pupal skin while the imago emerges from it.

The imagos, first appearing about the middle of March, continue to appear during all the spring and summer months.

For several years this was the only museum pest whose presence was dreaded in the entomological cabinets of the University of Kansas, but for the past three years *Anthrenus varius* has become quite as formidable a foe, having been introduced into the building in some eastern bird skins. Careful watching and the use of tight boxes have prevented serious damage to the collections from either of these pests.

ORGANS, PROBABLY DEFENSIVE IN FUNCTION, IN THE LARVA OF *HYPERCHIRIA VARIA*, WALK. (*SATURNIA IO*, HARRIS).

BY GEORGE DIMMOCK, CAMBRIDGE, MASS.

In examining a larva of *Hyperchiria varia* lately I found on each side a protrusile organ just posterior to, and a trifle below the level of the stigmata of the fourth segment, and a similar organ in the same position relative to the stigmata of the tenth segment, these segments being counted from and excluding the head.

These organs, when retracted, exhibit nothing more than an irregular opening, about half a millimetre in diameter, situated in the reddish lateral line which extends from the anterior part of the fourth segment to the posterior extremity of the larva. In this position they may be easily mistaken for some of the folds of the skin which are numerous along the lateral parts of this larva when at rest.

If the larva be disturbed by slightly touching the spines with which it is covered, and at the same time attention be given to the above-mentioned irregular openings, which should be observed under a lens, each opening will be seen to evaginate and to re-invaginate alternately. When evaginated to about a half a millimetre in height above the surrounding skin the appearance of the organ is very similar to that of a minute sea-anemone or actinia with its tentacles retracted, and this resemblance is enhanced by the flesh-like aspect of the whole extended portion of the organ, its color being about the same as that of the reddish lateral line in which it is situated. The organ is usually evaginated, as above described, upon any slight disturbance of the larva, to a distance of about .75 mm.

If the larva is greatly disturbed, especially suddenly, as by a sharp, quick stroke on the spines or by a pinching of the skin, the organ is sometimes further evaginated, a moment only, to over a millimetre in length. The distal extremity, when fully evaginated, is rounded, being terminated by a hemispheroidal portion of more delicate texture and of slightly lighter color than the proximal portion.

This organ is probably the opening of a gland, altho it never appears moist. The abundant moisture, however, which usually indicates glandular secretion in insects is not a necessary character of such secretion, any more in insects than in vertebrates. Silk and the woolly masses on aphides are examples of nearly dry solid secretions in insects, while the gas, permanent under ordinary conditions, which is emitted from the anal glands of *Brachinus* shows that an insect secretion may either be gaseous or become gas directly upon its emission. So the absence of appreciable moisture is no sure proof that the organs under consideration are not glandular. There is no odor about these organs, as far as I could determine, nor did their surface show either acid or alkaline reaction upon being touched with moistened litmus paper.

The function of these organs seems to be to defend the larva, already so thoroughly protected from many dangers by its urticating spines, from some kind of attack, for the organs are not in use when the larva is undisturbed and are more active in their protrusion and retraction the more the larva is disturbed. Their function may be to drive away some parasite, for against the attacks of ichneumons the sharp spines of this larva are an inadequate defense.

The improbability of four such organs as those described above escaping the notice of all the entomologists who had carefully examined the larva of *Hyperchiria varia* led me to look up all the accessible descriptions of that larva, but I found no mention of these organs in any of them. Harris, in his Entomological Correspondence,[1] and Riley, in his Fifth Report,[2] give quite extended descriptions of the larva and locate the different series of spiculiferous tubercles, but entirely overlook the organs which are the subject of this note.

As I have neither time nor material for the extended study of these organs I publish this brief note on their external appearance in the hope that some one will study them further, especially in regard to their internal structure and to determine their functions with certainty. It would be of interest to note whether the larva possesses these organs in all its different stages, a point which I was unable to settle because of having no very young larvae.

Cambridge, 7 Sept. 1882.

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[1] Occasional papers of the Boston society of natural history. I. Entomological correspondence of Thaddeus William Harris, M. D. Edited by Samuel H. Scudder. Boston, 1869. p. 295–297.

[2] Fifth annual Report on the noxious, beneficial and other insects of the state of Missouri, . . . by C. V. Riley, state entomologist. Jefferson City, 1873. p. 135.

PSYCHE.

CAMBRIDGE, MASS., JUNE 1882.

Communications, exchanges and editors' copies should be addressed to EDITORS OF PSYCHE, *Cambridge, Mass. Communications for publication in* PSYCHE *must be properly authenticated, and no anonymous articles will be published.*

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EDITORIAL.

The undersigned, who has been hindered by absence from the country and by pursuit of other occupations from taking active part in the editorial management of this paper, wishes to record his sincerest thanks to those editors, assistant editors and other friends of PSYCHE who have, during his absence, attended to the various duties connected with its publication.

Among those to whom especial thanks are due is the late Edwin C. Prentiss of Brighton, Mass., whose death it was a painful duty to announce in our numero for October 1880, who, in addition to the composition of PSYCHE, making it ready for the press and mailing it, added often, as gratuitous labor in the interest of the paper, work belonging strictly to its editorial department. Faithful, persevering and accurate, he removed much of the care of PSYCHE from the undersigned, who mourns his early death, caused by disease contracted while in the defense of our country in the south, rather as that of a personal friend than as that of an employé.

The accuracy of PSYCHE, upon which we are often complimented, is in a great measure due to the careful supervision of Mr. B. P. Mann, who has had not only the editorship of the bibliographical record, but has had most of the burden of the general editorship of the whole paper. In assuming the management of PSYCHE, the undersigned wishes to acknowledge Mr. Mann's services especially, without which it would have been impossible to continue the paper, and to announce that hereafter the responsibility for the general management rests upon himself.

During the past three years many books, pamphlets and periodicals have been received as gifts or in exchange, and the editors will now strive to have these, as far as they pertain to entomological subjects, properly noticed in our bibliographical record, and, in such cases as may seem best, reviewed.

The numeros of PSYCHE for each of the years 1880 and 1881 contained—to make a comparison readily perceptible to persons not familiar with printers' nomenclature—exclusive of title-pages and advertisements, matter equivalent to more than 227 pages of reading matter of volume one or two. To this will be added, at the end of volume three, an index much larger than that of volume one. It is unnecessary to add that PSYCHE never has paid its cost. For volume three it would be necessary to have a few more than double the present number of subscribers to make it pay its cost, exclusive of exchanges received. As the present publisher, who undertook the publication of PSYCHE in order to give the Cambridge Entomological Club—the founder of the magazine—time to accumulate a publication fund, will be obliged soon, under the pressure of other duties and responsibilities, to return the publication to the hands of its parent society, it is not, perhaps, improper here to solicit contributions to the publication fund of the society.

G: Dimmock.

BOOK NOTICE.

Mr. S. H. Scudder has published his paper, "Fragments of the coarser anatomy of diurnal lepidoptera," which appeared in the columns of our numeros for Oct. 1881 to April 1882, in book form. The book, which is somewhat novel in design and very neat in typography, is printed with wide margins on excellent paper. It contains 83 pages of 10.5 by 6 cm., type measurement, while the book measures 19.5 by 12.5 cm.

G: D.

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [ ], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

Corrections of errors and notices of omissions are solicited.

Caulfield, Frank Butler. Food habits of the longicorns. (Can. entom., March 1881, v. 13, p. 60.)

On the habits of *pogonocherus mixtus* and *gaurotes cyanipennis.* *G: D.* (2801)

Cement of the tussah cocoon. (Journ. applied sci., 1 Dec. 1880, v. 11, p. 186, 12 cm.)

Major G. Coussmaker reports that chemical analysis of the cement of the cocoon of the tussah silk-worm [*attacus mylitta*] shows it to be excrementitious and that it contains acidurate of ammonia [$C_5H_3(NH_4)N_4O_3$]. The excrement is voided while the caterpillar is spinning the cocoon. *G: D.* (2802)

Chambers, Vactor Tousey. On a larva of *mordella.* (Can. entom., Aug. 1881, v. 13, p. 173–175.)

Notes on the habits and food of the larvae of *mordella.* *A. K. D.* (2803)

Clay, Cassius M. The borer and sapsucker. (Land and home, 1 Jan. 1880, v. 1, p. 139, col. 4, 13 cm.)

Habits of [*?saperda bivittata*] and [*?sphyrapicus varius*]. *B: P. M.* (2804)

Clifford, J. R. S. Insect lights and insect sounds. London, Wesleyan conference office, [1880]. 94 [+ adv.] p., 16 × 12, t 11 × 8.5. cl.

Popular work with illustrations. *A. K. D.* (2805)

Cochineal production on the Canaries. (New remedies, Aug. 1881, v. 10, p. 256, 4 cm.)

Statistics of cochineal exports from the Canary Islands to different countries, during 1878–1880. *G: D.* (2806)

Codling moth (The). (Can. entom., Aug. 1881, v. 13, p. 176.)

Brief note on *carpocapsa pomonella.* *A. K. D.* (2807)

Cook, Albert J: Carbolic acid as a preventive of insect ravages. (Can. entom., Sept. 1881, v. 13, p. 189–191.)

Describes a method of destroying insects by means of a mixture of carbolic acid, soft soap and water. Paper read before the subsection of entomology of the Amer. assoc. advanc. science, at its Cincinnati (1881) meeting. *A. K. D.* (2808)

Coquillett, Daniel W: On the early stages of *hypena scabra,* Fabr. (Can. entom., July 1881, v. 13, p. 137–138.)

Describes egg, mode of oviposition, larva (which feeds on *trifolium pratense*) and chrysalis; gives length of time in the different stages. *A. K. D.* (2809)

Cori, Eduard. Ueber die *apis dorsata.* (Deutscher Bienenfreund, 1 April 1881, jahrg. 17, p. 98–100.)

Contains a letter from Frank Benton in which the four kinds of honey-bees of Ceylon are mentioned and their habits described. Two species, *a. indica* and *a. dorsata,* are especially mentioned as suitable for raising for economical purposes. *G: D.* (2810)

Cori, Eduard. Die *apis dorsata* ist aufgefunden. (Deutscher Bienenfreund, 15 July 1881, jahrg. 17, p. 211–214.)

Quotes letter from Frank Benton announcing the capture of four colonies of *a. dorsata.* Remarks on the subject. *G: D.* (2811)

Cultivation of *pyrethrum* (The) and manufacture of the powder. (Amer. nat., 1881, v. 15: July, p. 569–572; Sept., p. 744–746; Oct., p. 817–819.)

General account of how to raise *pyrethrum* and to make and use the insect-powder from it. *G: D.* (2812)

Dalla Torre, Karl W. Alphabetisches Verzeichniss der in den Jahren 1869–1879 aufgestellten Genus-Namen der Hymenopteren. (Entom. Nachrichten, 1 Dec. 1881, jahrg. 7, p. 330–344.)

Contains alphabetic list of new generic names for hymenoptera (from 1869–1879), citation of locality where described, and family to which each genus belongs. *G: D.* (2813)

Dan [*pseud.*]. Indian honey. (Journ. applied sci., June 1881, v. 12, p. 90–91, 74 cm.)

Notes on wild honey-bees of India and their honey. *G: D.* (2814)

Day, L. T. Notes on *sciomyzidae* with descriptions of new species. (Can. entom., May 1881, v. 13, p. 85–89.)

Notes on *tetanocera, sepedon* and *dryomyza.* New species described: *t. pubescens* (Wash. Terr.), *t. montana* (Wyoming), and *t. lineata* (Conn.). *G: D.* (2815)

Deutscher Bienenfreund. Zeitung für praktische Bienenzucht. Allgemeines Organ für deutsche Bienenwirthe und Organ des unter dem allerhöchsten Protectorat Sr. Maj. des Königs Albert stehenden bienenwirthschaftlichen Hauptvereins im Königreiche Sachsen, des bienenwirthschaftliche Hauptvereins der Provinz Sachsen, des Herzogthums Anhalt und für Thüringen und des bienenwirthschaftlichen Hauptvereins im Grossherzogthum Sachsen-Weimar. Herausgegeben von L. Krancher. 16ter Jahrgang. 1880. Crimmitschau, O: Grosse. [4] + 392 p., 25.5 × 17, t 20 × 13.5. M. 3.

A semimonthly journal devoted to bee-raising. *G: D.* (2816)

Dewitz, H. Beschreibung der Larve und Puppe von *liponeura brevirostris* Löw, Dipterenfamilie *blepharoceridae.* (Berl. entom. Zeitschr., 1881, v. 25, p. 61–66, fig. 3–16 of pl. 4.)

Notice. (Amer. nat., July 1881, v. 15, p. 567.)

External anatomy of larva and pupa of *l. brevirostris.* *G: D.* (2817)

Dewitz, H. Dipterenlarven, welche wie Blutegel kriechen. (Sitzungsber. d. Gesellsch. naturf. Freunde zu Berlin, 19 July 1881, no. 7, p. 103–106, fig.)

Mode of locomotion and other peculiarities of the larvae of *leucopis puncticornis.* *G: D.* (2818)

Dewitz, H. Ueber die Flügelbildung bei Phryganiden und Lepidopteren. (Berl. entom. Zeitschr., 1881, v. 25, p. 53–60, pl. 3, and fig. 1–2 of pl. 4.)

Discussion of the developmental stages of the wings of *phryganidae* and of lepidoptera, based, in part, on studies of the development of the wings in *trichostegia varia* and in *deilephila euphorbiae.* *G: D.* (2819)

Dewitz, Hermann. Vergleichende Untersuchungen über Bau und Entwickelung des Stachels der Honigbiene und der Legescheide der grünen Heuschrecke. Inaugural-Dissertation . . . zu Königsberg behufs Erlangung des Doctorgrades . . . Königsberg, 1874. 30 [+ 2] p., 21 × 15, t 15 × 8.5.

Notice. (Bericht . . . der Entomologie, 1875–1876, p. 124.)

Structure and development of the sting of *apis mellifica* and of the ovipositor of *locusta viridissima.* *G: D.* (2820)

Dodge, C: Richards. A new hickory pruner. (Land and home, 1 Jan. 1880, v. 1, p. 139, col. 2–3, 26 cm., fig.)

Description and figure of method of injury done to branches of *carya* by a cerambycid, "perhaps an *elaphidion,*" in Connecticut. *B: P. M.* (2821)

Drive away mosquitoes (To). (New remedies, Sept. 1881, v. 10, p. 285, 5 cm.)

Recipe for a pastil and for a wash to keep away *culex.* *G: D.* (2822)

Editors' table. (Amer. nat., April 1881, v 15, p. 302–305.)

Discusses government aid for the protection of agriculturists, and especially the work of the U. S. entomological commission; notes on losses to the United States by insect ravages. *G: D.* (2823)

Edwards, W: H: *Coenonympha elko.* (Can. entom., March 1881, v. 13, p. 57–58.)

Description of a new species of diurnal lepidoptera from Nevada. *G: D.* (2824)

Edwards, W: H: Description of preparatory stages of *agraulis vanillae,* Linnaeus. (Can. entom., July 1880, v. 12, p. 121.)

Describes egg, stages of larva (which feeds on *passiflora*), and chrysalis. *G: D.* (2825)

Edwards, W: H: Description of preparatory stages of *heliconia charitonia,* Linn. (Can. entom., Aug. 1881, v. 3, p. 158–162.)

Describes egg, larva in different stages, chrysalis, and notes duration of the different stages. *A. K. D.* (2826)

Edwards, W: H: Description of the preparatory stages of *apatura flora,* Edw. (Can. entom., May 1881, v. 13, p. 81–85.)

Describes egg, different stages of larva (which feeds on *celtis*), and chrysalis of the above species. *G: D.* (2827)

Edwards, W: H: Description of the preparatory stages of *libythea bachmanni,* Kirtland. (Can. entom., Nov. 1881, v. 13, p. 226–229.)

Describes egg, larvae in different stages, chrysalis, and figures imago; length of time in passing through the different stages, times of appearance of imago and larvae. *A. K. D.* (2828)

Edwards, W: H: Description of the preparatory stages of *papilio palamedes,* Drury. *calchas,* Fab. (Can. entom., June 1881, v. 13, p. 119–123.)

Describes egg, different stages of larva, and chrysalis. *G: D.* (2829)

Edwards, W: H: Description of the preparatory stages of *terias nicippe,* Cramer. (Can. entom., April 1881, v. 13, p. 61–63.)

Describes egg, larva (which feeds on *cassia marylandica*), and chrysalis of *t. nicippe.* *G: D.* (2830)

Fernald, C: H: Illustrations of typical specimens of lepidoptera heterocera in the collection of the British museum. Part 4. North American *tortricidae.* By Lord Walsingham. London: printed by order of the trustees, 1879. 4to, pp. 84, and 17 plates. (Entom. mo. mag., Sept. 1880, v. 17, p. 95–96.)

Rev. of T: de Grey's "Illustrations" [etc.; see Rec., 1942]. Essentially the same as the review in Psyche, Oct. 1880 [Feb. 1881], v. 3, p. 128.) *B: P. M.* (2831)

Fish, C: Pterophoridae. (Can. entom., April 1881, v. 13, p. 70–74.)

Describes 10 new species, all from the United States. *G: D.* (2832)

Forbes, Stephen Alfred. The english sparrow in Illinois. (Amer. nat., May 1881, v. 15, p. 392–393.)

Relative amount of insect and of other food found in stomach of *passer domesticus.* *G: D.* (2833)

French, G: Hazen. Correspondence. (Can. entom., July 1880, v. 12, p. 140.)

Correction to W: H: Edwards' "On certain species of *satyrus*" (Can. entom., June 1880, v. 12, p. 109-115) [Rec., 1817]. Suggestions in regard to D. W: Coquillett's "On describing larvae" (Can. entom., June 1880, v. 12, p. 108) [Rec., 1876]. *G: D.* (2834)

French, G: Hazen. Larvae of *cerura occidentalis* Lint., and *c. borealis*, Bd. (Can. entom., July 1881, v. 13, p. 144–145.)

Describes larva of *c. occidentalis* and of *c. borealis.* *A. K. D.* (2835)

French, G: Hazen. Notes on some noctuid larvae. (Can. entom., Feb. 1881, v. 13, p. 23–25.)

Notes on larvae of *mamestra trifolii*, *prodenia lineatella* and *leucania pseudargyria.* *G: D.* (2836)

French, G: Hazen. Notes on the preparatory stages of *papilio cresphontes*, Cram. (Can. entom., Sept. 1881, v. 13, p. 177–179.)

Describes egg, larva in different stages, and chrysalis; gives pupal period of fifteen specimens. *A. K. D.* (2837)

Garman, W. H. The egg-case and larva of *hydrophilus triangularis* Say. (Amer. nat., Aug. 1881, v. 15, p. 660–663, fig. 1–3.)

Describes and figures egg-case and larva of the above species; on stigmata and tracheae of the larva. *G: D.* (2838)

Gauckler, H. [Misbildung von *acronycta aceris.*] (Entom. Nachrichten, 15 July 1881, jahrg. 7, p. 216.)

Posterior wings and abdomen deformed in *a. aceris.* *G: D.* (2839)

[**Gauckler,** H.] Von einem verbesserten verstellbaren Spannbrett. (Entom. Nachrichten, 15 Jan. 1881, jahrg. 7, p. 35.)

Note on a new spreading board for lepidoptera. *G: D.* (2840)

Gould & Co. Fertilizer and insect exterminator. (Florida agriculturist, July 1881, v. 4, p. 64, 72.)

Advertisement and testimonials; this substance in solution said to destroy *coccidae.* *B: P. M.* (2841)

Graber, Vitus. Ueber den Bau und die Entstehung einiger noch wenig bekannter Stridulationsorgane der Heuschrecken und Spinnen. Mit 1 Tafel. Separatabdruck aus den Mittheilungen des naturwissenschaftl. Vereines. Jahrgang 1874. Graz, 1874. t.-p. cover, t.-p., 15 p., 1 pl., 22 × 15, t 17 × 10.

Mode of sonifaction in orthoptera, and in *steatoda bipunctata*, a spider. *G: D.* (2842)

de **Grey,** T:, *Lord Walsingham.* Illustrations of typical specimens of lepidoptera heterocera . . . Part 4 . . . [Rec., 1942].

Rev., by C: H: Fernald. (Entom. mo. mag., Sept. 1880, no. 196, v. 17, p. 95–96.)

The review is essentially the same as that furnished by the reviewer to Psyche, and published in no. 78, Oct. 1880 [Feb. 1881], v. 3, p. 128. *B: P. M.* (2843)

Grote, A: Radcliffe. [*Agrotis campestris* and *a. decolor.*] (Bull. Buffalo soc. nat. sci., Aug. 1877 [March 1881], v. 3, no. 5, p. 212.)

Points out the specific distinctions between the two species. *B: P. M.* (2844)

Grote, A: Radcliffe. [*Catocala frederici.*] (Bull. Buffalo soc. nat. sci., Aug. 1877 [March 1881], v. 3, no. 5, p. 217.)

Specimen exhibited, with specimens of other species, and its specific characters pointed out. *B: P. M.* (2845)

Grote, A: Radcliffe. List of North American *bombyciae* of Hubner. (Can. entom., July 1881, v. 13, p. 151–153.)

List, with localities of capture. *A. K. D.* (2846)

Grote, A: Radcliffe *and* Coleman Townsend **Robinson.** List of the lepidoptera of North America. **1.** Phil., Amer. entom. soc., Sept. 1868. t.-p. cover, t.-p. + 16 p., 26 × 17.

List of *sphingidae*, *aegeriidae*, *thyridae*, *zygaenidae* and *bombycidae* of North America north of Mexico. Index of genera. *B: P. M.* (2847)

Grote, A: Radcliffe. New *noctuidae*, with list of the species of *perigrapha.* (Can. entom., June 1881, v. 13, p. 131–134.)

Describes 4 new species of *agrotis*, 1 of *xylomiges*, 2 of *bomolocha*, and 1 of *deilinea*; list of the 5 species of *perigrapha* from the United States. *G: D.* (2848)

Grote, A: Radcliffe. North American *noctuidae* in the Zutraege. Fourth and fifth hundreds. (Can. entom., May 1881, v. 13, p. 90–92.)

Identification, as far as possible, of the species mentioned in Jacob Hübner's "Zuträge zur Sammlung exotischer Schmetterlinge" . . . [*see* Hagen, Bibl. entom., v. 1, p. 389]. *G: D.* (2849)

Grote, A: Radcliffe. The North American species of *mamestra*, Ochs. (Can. entom., June 1881, v. 13, p. 126–130.)

Catalog of the North American species of *mamestra* (incl. *dianthoecia*) with notes on habitat, synonymy and affinities. *G: D.* (2850)

Grote, A: Radcliffe. Note on *basilarchia.* (Can. entom., Sept. 1881, v. 13, p. 195.)

Notes on relationship of some species of *basilarchia.* *A. K. D.* (2851)

Grote, A: Radcliffe. Note on *hemaris buffaloensis.* (Can. entom., Aug. 1881, v. 13, p. 175.)

Discusses validity of the species. *A. K. D.* (2852)

Grote, A: Radcliffe. Notes on *crambus.* (Can. entom., April 1881, v. 13, p. 66–67.)

Notes on 5 species and their distribution. *G: D.* (2853)

Hagen, Hermann August. Entomological notes. (Can. entom., Feb. 1881, v. 13, p. 37.)

Notes upon a species of *cecidomyia* and upon larva of *papilio philenor*, both found on *aristolochia sipho*; and upon larvae of *nematus erichsoni* found on *larix europaea* [*corr.*]; all from Cambridge, Mass. *G: D.* (2854)

Hagen, Hermann August. Entomology. (Harvard register, Feb. 1881, v. 3, p. 75–79, 160 cm.)

Estimates of the number of species of insects; arrangement of insects in the Museum of comparative zoology at Cambridge, Mass.; some of the collections which it contains; the biological collection of insects as a specialty of this museum; describes a box to illustrate *samia promethea* in the biological collection. *G: D.* (2855)

Hagen, Hermann August. List of N. American *anthomyidae*, examined by R. H. Meade, esq., Bradford, England. (Can. entom., March 1881, v. 13, p. 43–51.)

Abstract, entitled, "North American *anthomyiadae*." (Amer. nat., May 1881, v. 15, p. 402.)

Enumerates the species which are in the Museum of comparative zoology at Cambridge, Mass., with localities of capture and other notes. *G: D.* (2856)

Hagen, Hermann August. List of N. American *sarcophagidae*, examined by R. H. Meade, esq., Bradford, England. (Can. entom., July 1881, v. 13, p. 146–150.)

List of the *sarcophagidae* in the Museum of comparative zoology at Cambridge, Mass., with notes on synonymy and locality of capture. *A. K. D.* (2857)

Hagen, Hermann August. A new enemy of the black spruce, *abies nigra*. (Can. entom., July 1880, v. 12, p. 121.)

Larva of *tineidae*, of an undetermined species, which devours the parenchyma of the leaves of *a. nigra*. *G: D.* (2858)

Hagen, Hermann August. On *simulium*. (Can. entom., July 1881, v. 13, p. 150–151.)

Notes on larva, pupa and imago of *simulium*. *A. K. D.* (2859)

Hammond, Arthur. On the thorax of the blow-fly, *musca vomitoria*. (Journ. proc. Linn. soc., Zool., March 1880, v. 15, p. 9–31, pl. 1–2.)

Discusses mainly the homology of the hard parts. Divides the subject into: general remarks and descriptive anatomy, considerations of analogies in divers insects, evidence from developmental change and evidence from the muscular and nervous parts. *G: D.* (2860)

Heller, Arnold. Die Schmarotzer mit besonderer Berücksichtigung der für den Menschen wichtigen. Mit 74 Holzschnitten und einer Karte in Farbendruck. (Die Naturkräfte. Eine naturwissenschaftliche Volksbibliothek, bd. 30.) München und Leipzig, R. Oldenbourg, 1880. t.-p. cover, 16 + 230 [+ adv.] p. il. pap., 3 M.

General popular work on parasites, including insects as parasites and parasites of insects. *G: D.* (2861)

Heustis, Caroline Eliza. Notes on a parasite of *pyrameis cardui*. (Can. entom., July 1881, v. 13, p. 143–144.)

Ichneumon rufiventris parasitic on the larva of *p. cardui*. *A. K. D.* (2862)

Honey crop (The). (Pacific rural press, 2 July 1881, v. 22, p. 4, col. 4, 3 cm.)

Statistics of the honey crop in San Bernardino co., Cal. *B: P. M.* (2863)

Horn, G: H: Contributions to a knowledge of the *curculionidae* of the United States. (Proc. Amer. philos. soc., 19 Sept. 1873, v. 13, p. 407–469.)

Separate, [Phil.], 6 Nov. 1873. t.-p. cover, p. 407–469, 24 × 15, t 17 × 9.7.

Rev., by G: H: Horn. (6th ann. rept. trustees Peabody acad. sci., for 1873, 1874, p. 98.)

Rev., by E. C. Rye. (Zool. rec. for 1873 . . . VanVoorst, Lond., 1875, v. 10, p. 295.)

Synoptic tables, descriptions of the genera and species of the tribes *calandrides* and *cossonides*, also of the genera *ithycerus*, *otidocephalus*, *magdalis*, *balaninus*, *orchestes*, *rhyssomatus*, *chalcodermus* and *analcis*. *S: H.*

Describes 4 new genera: *metamasius*, *dryotribus*, *wollastonia* and *elassoptes*. Describes over 30 new species. *H: W. T.* (2864)

Horn, G: H: Critical notes on the species of *selenophorus* of the United States. (Proc. Amer. philos. soc., 5 Nov. 1880, v. 19, p. 178–183.)

Describes one new species, *s. breviusculus*. *H: W. T.* (2865)

Horn, G: H: A monographic revision of the species of *cremastochilus* of the United States. (Proc. Amer. philos. soc., 19 Dec. 1879, v. 18, p. 382–397, pl. 4, fig. 1–11.)

Describes 1 new species, *c. westwoodi*. *H: W. T.* (2866)

Horn, G: H: A review of the species of *anisodactylus* inhabiting the United States. (Proc. Amer. philos. soc., 5 Nov. 1880, v. 19, p. 162–178.)

Describes *a. pilosus*, *a. immanis*, *a. nivalis* = 3 new species. Synonymy and bibliography given. *H: W. T.* (2867)

Horn, G: H: Revision of the species of several genera of *meloidae* of the United States. (Proc. Amer. philos. soc., 21 Feb. 1873, v. 13, p. 88–117.)

Rev., by G: H: Horn. (6th ann. rept. trustees Peabody acad. sci., for 1873, 1874, p. 98.)

Rev., by E. C. Rye. (Zool. rec. for 1873 . . . VanVoorst, Lond., 1875, v. 10, p. 294.)

Describes the genera and species and gives synoptic tables of *macrobasis*, *epicauta*, *cantharis* and *pomphopoea*. *S: H.*

The following new species described: *macrobasis virgulata* Lec., *epicauta sericans* Lec., *e. callosa* Lec., *e. caviceps* Lec., *e. pedulis* Lec., *e. pardalis* Lec., *e. funebris* Horn, *cantharis viridana* Lec., *c. puberula* Lec., *pomphopoea unguicularis* Lec., *p. texana* Lec. *H: W. T.* (2868

Horn, G: H: Revision of the species of the sub-family *bostrichidae* of the United States. (Proc. Amer. philos. soc., 19 April 1878, v. 17, p. 540–555.)

Describes genera and species, figures antenna of *tetrapriocera*. *S: H.*

Describes the new genus *tetrapriocera* and 16 new species, belonging to the genera *sinoxylon*, *tetrapriocera*, *bostrichus*, *amphicerus*, *dinoderus* and *polycaon*. *H: W. T.* (2869)

ENTOMOLOGICAL ITEMS.

Unfavorable weather and insects are said to have done much damage to the hop plant this year.

The fifty-fifth meeting of the German naturalists and doctors takes place 18 to 24 September, this year, at Eisenach.

Destitution is reported by the daily press as existing in Bolivia, in June, owing to the destruction of the crops by locusts.

Mr. N. F. Graves, President of the N. Y. State Banking Co., Syracuse, N. Y., has a library of over 10,000 volumes of books which is "open to all students and professional and scientific men."

Five Colorado beetles (*Doryphora decemlineata*) were found, according to reports in the newspapers, on board the Wisconsin at Liverpool recently, and, by order of the privy council, were killed and sent to London.

Locusts are devastating the United States of Columbia and notice has been given to Cuba to take measures to prevent their being conveyed in cattle-ships to Cuba and thence to the United States.—*Springfield daily republican*, 12 Aug. 1882.

Bulletin no. 7 of the United States Entomological commission, compiled by Dr. A. S. Packard, jr., on "Insects injurious to forest and shade trees," a stout pamphlet of 275 pages and 100 figures, was issued in March 1882. Only 2000 copies were printed.

Mr. William T. Davis has found the earwig *Anisolabis maritima* (Bon.) very abundant under stones on the sea shore at Staten Island, N. Y. According to Scudder's Synopsis this species, which has spread over a large part of the world, has never been found before in this country, north of North Carolina.

Prof. Cyrus Thomas, of Carbondale, Ill., has resigned his position as state entomologist of Illinois, after publishing six annual reports, and Prof. Stephen Alfred Forbes, director of the Illinois state laboratory of natural history, at Normal, Ill., has been appointed state entomologist, dating his commission from 1 July 1882.

Two new parasitic protozoans from the larva of *Melolontha vulgaris* and one from the larva of *Oryctes nasicornis* were announced by J. Kunstler, 14 Aug., in the French Academy. One of the protozoans from the larva of *M. vulgaris* is elongated and has six flagellums, the other is more globular and has only four flagellums.

The third part of the third volume of the Proceedings of the Davenport academy of natural sciences is to be made a memorial of the late president of the academy, Joseph Duncan Putnam, and will contain, amongst other matters, his unfinished work on the *solpugidae*, which has been arranged for publication by Prof. Herbert Osborne, of Ames College, Ames, Iowa.

The vigorous measures taken for the destruction of the locust plague in Cyprus have resulted, in the belief of the authorities, in the destruction of fully seven-eighths of the whole quantity of locusts with which the island is infested. It is feared, however, that the survivors are still numerous enough to inflict much damage upon the wheat and other late crops.—*Colonies and India*, 9 June 1882.

We call especial attention of the secretaries of the entomological societies in North America to our column of "Society meetings." Those secretaries who have already sent us the dates of meeting for 1882–1883 are asked to examine the lists and see if the dates are correct, and the secretaries who have not yet sent us notices for the societies which they represent are hereby requested to do so.

The advertisements in Psyche will be fewer hereafter than heretofore, while the space devoted to items will be increased; all for the benefit of our subscribers, who are therefore requested to forward interesting items and new subscriptions. The attention of subscribers is asked to the mailing tag of this numero, the date of which is the date of the last numero paid for. Tags without a date indicate exchange or free copies.

Charles Godfrey Siewers, of Newport, Ky., who has written articles on entomological subjects for the *American naturalist*, *Canadian entomologist*, and other periodicals, died 6 Sept. 1882, at 5 p. m., at his residence in Newport. He was born 24 May 1815 on the island of Santa Cruz in the Danish West Indies, and was a son of the Rev. Henry Frederick Siewers, a missionary of the Moravian church. He leaves a widow, four sons, and a daughter.

THE FRENCH Association for the advancement of the sciences holds its annual congress for 1882 at La Rochelle (Charente-Inférieure), beginning 24 August. The section of zoology is under the presidency of Dr. Jousset de Bellesme, Professor of physiology at the medical school in Nantes, and among the interesting objects for observation to which he calls attention in the circular announcing the congress are the termites and their nests, which may be seen at Rochefort and in certain parts of La Rochelle.

FETT AUS MAIKÄFERN. The “Wiener landwirthschaftlicher Zeitung” gives, apropos of the description of an occurrence of may-beetles, amongst other ways of utilizing may-beetles, the following: “If may-beetles, which are tied in a bag, are boiled, a rather strong layer of a yellow, butter-like fat of good taste will collect on the surface of the bag, and this fat, like any other fat, can be utilized, and, for instance, quite good soap can be made from it.—From *Deutsch-Amer. Apotheker-Zeitung*, 1 July 1882, jahrg. 3, p. 231, col. 3.

A NEW VESICANT. From Dr. Jose Amengue, Barcelona. The author describes a beetle, *Oenas afer*, which occurs in enormous numbers in southern Spain and therefore can be prepared more cheaply than cantharides. The application, moreover, is painless(?). As far as the author knows, the insect, administered internally, has no effect upon the genito-urinary organs. The author draws his conclusions from experiments on himself and on his scholars. (*Brit. Med. Journ.*)—From *Deutsch-Amer. Apotheker-Zeitung*, 1 July 1882, jahrg. 3, p. 231, col. 2.

SOCIETY MEETINGS.

THE REGULAR meetings of the Cambridge Entomological Club will be held at 7.45 p. m., on the days following:—

13 Oct. 1882.
10 Nov. “
8 Dec. “
12 Jan. 1883.
9 Feb. “
9 Mar. 1883.
13 Apr. “
11 May “
8 June “

W: TRELEASE Secretary.

THE REGULAR meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following:—

25 Oct. 1882.
22 Nov. “
27 Dec. “
24 Jan. 1883.
28 Feb. 1883.
28 Mar. “
25 Apr. “
23 May “

—— —— *Secretary.*

THE REGULAR meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following:—

14 Oct. 1881.
11 Nov. “
9 Dec. “
13 Jan. 1882.
10 Feb. “
10 Mar. 1882.
14 Apr. “
12 May “
9 June “

JAMES H. RIDINGS, *Recorder.*

THE SEMI-ANNUAL meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following:—

12 Dec. 1881.
12 June 1882.

JAMES H. RIDINGS, *Recording Secretary.*

THE REGULAR monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following:—

3 Oct. 1882.
7 Nov. “
5 Dec. “
9 Jan. 1883.
6 Feb. 1883.
6 Mar. “
3 Apr. “
1 May “

G: J. BOWLES, *Secretary.*

THE REGULAR meetings of the Brooklyn Entomological Society will be held at 9 Broadway, Brooklyn, E. D., N. Y., on the days following:—

28 Oct. 1882.
25 Nov. “
30 Dec. “
27 Jan 1883.
24 Feb. “
31 Mar. 1883.
28 Apr. “
26 May “
30 June “

F. G. SCHAUPP, *Secretary.*

No. 97 was issued 19 Aug. 1882.

PSYCHE,

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

[Established in 1874.]

EDITED BY

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Albert J: Cook, *Lansing, Mich.;* Clifford Chase Eaton, *Cambridge,*
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H: Ward Turner, Joseph Martin Wilson.

Vol. 3. No. 99.
July 1882.

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Cambridge, Mass., U. S. A.: Published by George Dimmock.

YEARLY SUBSCRIPTIONS, $1. MONTHLY NUMEROS, 15 c.

[Entered as second class mail matter.]

PSYCHE, Organ of the Cambridge Entomological Club.

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EARLY STAGES OF BUTTERFLIES WANTED

The undersigned desires to obtain, by exchange or otherwise, from all parts of the world, eggs, caterpillars and chrysalids of Diurnal Lepidoptera. Dried specimens are preferred, especially of caterpillars, which should be prepared by inflation. Correspondence is invited with persons engaged in the study of the early stages of butterflies.

S. H. SCUDDER,
Cambridge, Mass.

COCCIDAE WANTED.

The undersigned is desirous of obtaining by exchange or otherwise specimens of as many species of the COCCIDAE as possible, for the purpose of making a study of the North American forms. Those found infesting cultivated plants especially desired. Living specimens preferred when they can be obtained.

J. HENRY COMSTOCK,
Department of Entomology,
The Cornell University,
Ithaca, N. Y.

GALLS AND GALL INSECTS.

The undersigned desires, either by exchange or otherwise, Galls from all parts of the United States. He is especially interested in those made by *Lepidoptera, Coleoptera, Homoptera* and *Diptera.* Correspondence in reference to Gall growths, or other vegetable abnormities, is invited.

CHARLES V. RILEY,
1700 Thirteenth St., N. W.,
Washington, D. C.

TORTRICIDAE WANTED.

I am desirous of obtaining as many North American TORTRICIDAE as possible, for the purpose of studying this family. I shall be glad to name and return any TORTRICIDAE forwarded to me for this purpose, save such as may prove new and desirable to retain for description.

Pack carefully, and direct to
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PSYCHE.

CONTRIBUTION TO THE KNOWLEDGE OF SONIFACTION IN INSECTS.

BY OSKAR PAUL KRANCHER, LEIPZIG, GERMANY.

In my rearing of *Saturnia pyri*, this year (1882), I had the pleasure of making an observation which was entirely new to me and which, in my opinion, the literature of the subject, up to the present time, does not mention. It was that after the larvae of the above-mentioned moth had passed their last molt,— the molt in which the violet tubercles that clothe the whole body are changed into the well-known sky-blue ones adorned with a stelliform covering of hairs,— and were almost full-grown, I was astonished to find that they were suddenly able to produce a peculiar noise. Whenever I came near them and still more when I touched them, I heard a sort of grating, perhaps more correctly a whurring, which was not unlike the guttural, non-vocal rattling of *r*, and which has been observed in a kindred way in certain beetles. This sound can best be imitated artificially by drawing a little stick or perhaps a wire, not too quickly over a grooved surface.

For lack of time I could not determine then how this sound was produced, but I think I am not mistaken in supposing that it is produced near the mouth-parts, if not by those organs. It appears to me almost as if the above-mentioned whurring might be considered a sort of cry, one might almost say a scolding, since the larva, even upon the slightest touch, not rarely jerks the whole anterior part of its body in the most forcible manner, from one side to the other, at the same time producing the whurring sound. The slightest irritation also is followed by this whurring. But I always observed that the larva drew in its head more or less, according as the sound lasted for a greater or less length of time, of course only while the sound was being produced.

When I communicated this observation at a June meeting of the entomological society here it appeared that the facts were not known, up to that time, to any of the persons present, which has induced me to publish this note. I hope I shall soon succeed in rearing a new brood of *S. pyri*, in order to carry my observations further. I may remark, further, that I obtained, in this year's breeding, 19 larvae from 20 eggs, and from these larvae 16 pupae, from which I hope to obtain the moths next spring.

Permit me at the same time to notice here two other interesting items. Last year (1881) Mr. Brabandt reared the larvae of *Stauropus fagi* (called the crab-caterpillar on account of its shape) which larvae, as is well-known, always quarrel with each other and are fond of biting off each other's front-legs. Under such circumstances Mr. Brabandt obtained a larva which had lost one of its long fore-legs in a contest, but this appeared to disturb the insect little; and it continued feeding unconcernedly and pupated; and, on 5 June of this year, the moth emerged. The moth showed only the single defect of not possessing the leg corresponding to the one which the larva had lost.

The following may serve as a contribution to the subject of the fertility of lepidoptera. Mr. Brabandt obtained from a chrysalis, this spring, a female *Lasiocampa quercifolia.* As it was crippled he decided to set it out of doors in order perchance to attract a male, or in other words to secure a fertilization. Luck favored him; the next morning he found the female, only a few steps distant, in copulation with a male. The latter, in fine condition, was spread, but the female was imprisoned for the purpose of obtaining eggs. Behold! she did her duty in the most thorough way, for during the first night she laid no less than 510 eggs, and during the second night 70 more, — a total of 580 eggs, a fecundity on the part of a lepidopteron which is remarkable, and very rarely recorded. Not a single egg was abortive, and each one hatched its young larva.

Leipzig, 10 Aug. 1882.

ON A LARVA BORING THE LEAF-STALKS OF THE BUCKEYE (*AESCULUS GLABRA*) IN OHIO.

BY EDWARD WALLER CLAYPOLE, NEW BLOOMFIELD, PERRY CO., PA.

Several years ago, soon after going to reside at Yellow Springs, Ohio, I noticed, in the early part of May, that many of the leaves of the Ohio buckeye, *Aesculus glabra*, drooped and withered very soon after they had unfolded from the bud. For two or three years these drooping leaves caught my attention. On gathering them I uniformly found a small hole in the leaf-stalk, from which a tunnel, sometimes twelve millimetres in length, ran along the stalk. Above this hole the leaf was dying, below it the stalk was still alive. In some few instances I found in the tunnel a small yellowish caterpillar, evidently the author of the mischief. Wherever the hole in the stalk was closed with droppings the caterpillar was present, but whenever the hole was open the caterpillar was gone, leading to the inference that it had escaped through the opening.

After having made these preliminary notes I attempted, in May 1878, to trace out the life-history of this insect, but, being very much pressed with work, the experiment was a failure. The leaves were overlooked for a few days of warm weather, became mouldy, and the caterpillars died.

In 1879 I made a second attempt with rather better success, but still without result of moment. The main difficulty lay in the fact that the early stage, during which the insect could be found in the leaf-stalk, was of very short duration, and if, in the pressure of other occupations, I forgot to note the unfolding of the buckeye leaves, or had not time to walk to the place where they grew, the chance for that year was gone. The buckeye unfolds very suddenly and very quickly in the spring; consequently there are but a few days during which the caterpillar can be found.

However, I have succeeded in obtaining some every year since, and in the two years 1880 and 1881 I reared a few to maturity.

In the early part of May, usually about the second or third, I found the drooping leaves of the buckeye in great numbers. I gathered, 8 May, a quantity of the leaves, and, among them, a single specimen in which the caterpillar was in the main stem of the young shoot and not in the leaf-stalk — the only instance of the kind that I have met with. Taking the specimens home I placed them under a bell-glass in order to determine the first point in doubt, the destination of the caterpillars after leaving the leaf-stalk. Two days afterwards, on 10 May, I found that the leaf-stalks were all empty and the caterpillars hidden in the faded leaf at the top of the stem in which they had previously burrowed. On 15 May, five days later, the caterpillars were still in the dead leaves, and I went to the trees to try and find some more specimens, but was unsuccessful. However, on 21 May, I found a few rolled-up leaves containing caterpillars, brought them home and placed them with the others.

On 23 May the surviving caterpillars were still feeding, but there were many dead ones.

On 25 May I found the first chrysalis among the leaves. It was light red in color, with eight rings on the abdomen. The rolled-up leaf was lined inside with silk. These facts show nothing in any way peculiar, and the same description would apply to thousands of other chrysalids.

A caterpillar, examined on 13 May 1881, was one centimetre long, semi-transparent, yellowish in color with a yellow head, and this appearance was retained, except that the caterpillar became a little darker, until it went into the pupal state about 20 May.

It was difficult to see what the caterpillars lived upon, as the fresh leaves that I put with them were not attacked. I have noted this point for several years and have come to the conclusion that the food of the larva is the dead, dry leaf in which it is rolled up. I have looked carefully on the trees and can find no eaten or nibbled leaves near those containing the caterpillars, so, apparently, its habit is the same, in this respect, both in captivity and in its native habitat.

On 9 June, fifteen days after entering the pupal state, the first moth emerged. It was small, with a peculiar hopping flight, the fore wing mottled black and white, and the hind wing more uniform in color, dusky, and slightly spotted with black near the tip.

It appears as if the second stage in the life of this insect is that in which it most frequently falls a prey to its foes. During its earliest existence it is sheltered in the tunnel it has bored in the stalk, and there seems no cause but the want of room to prevent its remaining there and burrowing down the whole length of the stem. But these quarters soon become too small for it, it leaves the tunnel by the hole at which it entered and betakes itself to the dead and curled leaf. Here it is easily found by other insects, and, from the difficulty of obtaining specimens in this stage, I infer that a very large number are destroyed by their enemies.

In examining the chrysalids which I had obtained, I noticed that two or three were much larger than the rest, and I suspected that, in collecting nibbled leaves from the buckeye, I had introduced the larvae of some different species. This suspicion was changed to certainty when the moths emerged. Beside the genuine imago of the buckeye stem-borer, with which, by this time, I was quite familiar, I had two or three specimens of double its size, with cinnamon-colored wings having the costal edge in the form of a double curve. Not knowing the name of either species, I pinned them for future examination. Most entomologists know the tedious and hopeless nature of the search through scattered publications for the figure or description of some unknown insect, but, casually looking over the report of the Entomological Society of Ontario for 1873, I found the larger of the two species figured and described by Mr. Saunders in an article on insects injurious to the raspberry (*Rubus*), and found that it was the banded raspberry leaf-roller, *Loxotaenia* (wrongly written *Lozotaenia*) *rosaceana*, Harris. It follows, therefore, that in Ohio this insect lives on the buckeye as well as on the raspberry.

Though I have given the life-history of this insect so far as I have been able to trace it, yet other parts still remain to be worked out. I have not been able to determine where and when the egg is laid, whether in early spring before the buds open, or later, after the buds for the next year have been formed. In the former case the moth must be very long-lived, lasting through the summer and then hibernating until spring, or the species must be double-brooded in this district. In the latter case the eggs must remain on or in the bud all winter until it unfolds in spring, which seems unlikely. Moreover, if the egg is laid in the bud, the young caterpillar must find its own way to the stalk of the leaf. On the whole it seems more probable that the eggs are laid in spring and upon the stem of the leaf into which the larva can at once bore.

Specimens of the perfect insect were sent to Dr. C. V. Riley and were referred by him to Prof. C. H. Fernald. Though the specimens were somewhat rubbed and the peculiar markings consequently faint, both these entomologists inclined to refer them to *Proteoteras aesculanum*, a new genus and species described by Dr. Riley in 1881,[1] though at first there was a suspicion that the insect was *Sericoris instrutana*,[2] Clem., the larval state of which was not then fully known. Specimens, however, raised during the present season from larvae obtained in Ohio[3] have thrown doubt on this identification, but no specimen has been obtained sufficiently perfect to decide the question. Dr. Riley, however, informs me that the study of a specimen bred, in 1873, from the *blossom* of the buckeye, which specimen he finds specifically identical with mine, renders it certain that the insect is not *Proteoteras aesculanum.*

---

[1] *See* Trans. Acad. Science St. Louis, v. 4.

[2] *See* Proc. Amer. Assoc. Advanc. Sci., 1881.

[3] It is perhaps worthy of notice that, among these few specimens (in 1882), a single *Loxotaenia rosaceana*, Harris, made its appearance. Also that although the buckeye is commonly planted at my present residence, in Perry county, Penn., yet I have never seen a sign of the presence of this insect upon it.

Dr. Riley has very kindly allowed me to see his notes on, and figures of *P. aesculanum.* which show several points in which that species markedly differs from the species which I reared. These points are as follows :—

1. The larva here described bores the leaf-stalk of the buckeye and only once have I found a specimen in the terminal twig. *P. aesculanum* bores the terminal twig as well as the leaf-stalk.

2. *P. aesculanum* bores the terminal twigs of maple (*Acer dasycarpum*). I have never seen a specimen of the insect here described on a maple nor have I seen a maple twig or leaf showing indications of its presence.

3. *P. aesculanum* often forms a swelling or pseudogall on the stem. The species here alluded to never forms a gall.

4. *P. aesculanum* lives in the gall apparently through almost its whole larval stage. The insect here described, however, quits the leaf-stalk at the end of two or three days and lives in a rolled-up leaf.

5. *P. aesculanum* bores the stem to a depth of from 13 to 50 mm. The insect here alluded to seldom or never exceeds 13 mm. in its boring.

I may add here a few words from a recent letter from Dr. Riley. He writes :

"You are safe in changing the determination of your species, for it certainly is not *Sericoris instrutana*, Clem. You are safe in saying the species is close to *P. aesculana* but nevertheless different, not only in structure and in some of the details of its markings but more particularly in having shorter and more acuminate front-wings. But it is impossible to characterize it either generically or specifically until you get absolutely perfect specimens."

In conclusion I must express my indebtedness to Prof. Fernald and Dr. Riley for the trouble they have taken and the help they have given me. It is only right, also, to add, as an excuse for the imperfect state of this paper, that the doubt concerning the identity of the insect did not arise until the greater part of the paper was in type. This doubt cannot be removed until the brood for 1883 is obtained. In the meanwhile Prof. Fernald has referred the insect, provisionally, to the genus *Steganoptycha*, Stephens (1834), under the name *S. claypoleana.*

NOTES ON *SPHINGIDAE.*

BY LAFAYETTE WASHINGTON GOODELL, AMHERST, MASS.

Deilephila lineata is the most common of all the *sphingidae* here. I have never found the larvae on anything but purslane, *Portulaca oleracea*, one of the worst of our weeds, and on the cultivated species, *P. grandiflora* ; and on these they are found, in all stages of growth, from June to November. I have seen the half-grown larvae crawling about on the ground as late as 10 Nov., in search of their food-plant which had been destroyed by early frosts. It is not uncommon to see the moths on wing in midday, and often in the full sunshine. The moths are particularly fond of the petunia and verbena, and so abundant are they this month (Sept.) that hundreds of them can be seen in an evening hovering over fields of these flowers. The moths from the winter chrysalids first appear early in June, and those from the first brood of larvae early in August.

Scarcely less abundant than *D. lineata* is *Dolba hylaeus* which occurs from June to September. Next in abundance comes *Sphinx gordius*, from May to September. *S. kalmiae* is common from the first part of June to August, and *S. drupiferarum* through June. *S. eremitus* is common from the middle of June to the middle of August. *Darapsa choerilus* is common from the middle of June to the middle of July. *Philampelus achemon* and *P. satellitia* are rather common from the latter part of June to August. *Macrosila quinquemaculata* is very common from June to September, but *M. carolina* is rather rare. The same remark will apply to *Sphinx chersis*. The larvae of *Ceratomia amyntor* feed on the elm (*Ulmus*) and on the white birch (*Betula alba*), but are not common.

Our most common *Smerinthus* is *S. excaecatus*, occuring in July and August. A female taken 15 July and confined in a box deposited 331 eggs from 15 to 20 July, about 30 being laid each evening at dusk and the same number in the morning. This was done quite regularly, no eggs being laid at any other time. The eggs are cylindrical, flattened, 2.5 mm. in diameter, and grass-green in color. The larvae began to appear 22 July and all were hatched by 28 July. The young larvae measure 4.7 to 5 mm. in length, and are yellowish green with a darker dorsal line. Head pale green, and twice as wide as the body. Caudal horn long, dull red.

Among the rarest of our *sphingidae*, of which I have taken but one or two specimens each in nine years of collecting, are *Smerinthus modestus* (22 June and 20 July), *S. geminatus* (3 Aug.), *Sphinx luscitiosa* (20 June), *Thyreus abbotii* (in May), *Deilephila chamaenerii* (2 June), *Choerocampa tersa* (15 July), *Darapsa versicolor* (8 July), *Ellema harrisii* (2 June).

Amherst, 13 Sept. 1882.

Mummy of a wasp.—In Maspero and Brugsch's work "La trouvaille de Deir-el-Bahari" (1881) is given, according to a note presented by M. Van Segvelt in the July meeting of the Société entomologique de Belgique, a notice of a wasp found preserved in the coffin of Amenophis I, the illustrious king of Egypt. The wasp, attracted probably by the flowers with which the mummy of the king was wrapped previous to interment, had entered the coffin and thus furnished us probably the only specimen of a mummy of a wasp.

De Rhoné, in his "Résumé chronologique de l'histoire d'Egypte," places the accession of Thoutmes I, the successor of Amenophis I, to the throne in 1668 B. C. This insect therefore died 3550 years ago, and is probably the only insect of which the date of death was of such remote antiquity and is so certainly recorded. The name of the species is not given.

PSYCHE.

CAMBRIDGE, MASS., JULY 1882.

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CORRESPONDENCE.

Habits of Thrips.

Possibly the readers of Psyche may be interested in an observation that I have recently made upon the food-habits of *Thrips,* which, though it may have been noticed often, I do not find recorded in works at hand.

A few days since, finding *Thrips* (a species of *Phloeothrips* of which I find no description) very abundant in all the fruit blossoms that I examined, I was led to notice more particularly their method of work, and soon became convinced that they were doing much damage by preventing fertilization, as their injuries to the tender style would cut off all communication between the stigma and the ovary. A careful examination of a number of unopened buds revealed the fact that in eighty per cent of them the style had been more or less injured by biting and puncturing, while the great number of *Thrips* present could leave no doubt that they were the authors of the mischief. In the majority of the buds examined the styles seemed to be injured far more than any of the other parts of the blossom. Less than ten per cent of the buds examined contained larvae of *Tortricidae.* Of the remaining buds a small percentage contained no *Thrips,* perhaps because they were not quite so far advanced as the other buds. The *Thrips* probably enter the buds as soon as they can crowd in between the overlapping petals.

If the habits of *Thrips* are, in general, as described above they have an economic as well as a scientific interest.

Herbert Osborn.

Ames, Iowa, 23 May 1882.

PROCEEDINGS OF SOCIETIES.

Cambridge Entomological Club.

(*Continued from p.* 328.)

10 Feb. 1882.— 82nd meeting. Mr. S: H. Scudder exhibited a copy of Brongniart's recent paper on fossil insects forming an Annexe to Andrée's work on hymenoptera, in which are discussed the fossil hymenoptera of the periods since the lias. He also showed a proof page of his own index to zoological genera, explaining the plan of the work. Mr. Scudder called attention to the very low prices at which the collections of coleoptera of Mr. E: P. Austin and of the late Mr. G: D. Smith were offered for sale.

Mr. S: H. Scudder exhibited a drawing illustrating the wing of a heteropterous insect from carboniferous strata, of a period earlier than any in which heteroptera had been found. He also showed a very perfect carboniferous cockroach.

Mr. W: Trelease remarked on the part that insects play in the pollination of New Zealand flowers, with reference to what has been published on the subject, especially to the communications of Charles Darwin and G. Thomson.

Mr. R. Hayward spoke of the insects—*carabidae, dytiscidae, Aphodius* and *notonectidae*—found in the stomach of a kingfisher (*Ceryle alcyon*) in Maine, last summer. Attention was drawn to the large proportion of *carabidae.*

10 March 1882.— 83rd meeting. Mr. A. P. Chadbourne, of Cambridge, Mass., was elected a member. The constitution and by-laws of the Club were amended. [*See* p. 335.]

Mr. S: H. Scudder showed a paper by Dr. Fritsch, of Prag, on a fossil ephemerid and on other fossil insects, commenting on the paper and calling attention to the figures of cretaceous insects as being almost the first insects of this period figured, and forming an important contribution to our knowledge of fossil insects.

Mr. S: H. Scudder showed figures of American tertiary *ephemeridae* from Florissant, Col., showing that in the form of the body, in the stoutness of the legs, and in the respiratory apparatus they differ strikingly from living forms. Remarks were also made on the first fossil lepismid, showing to what extent it differs from living lepismids. Mr. Scudder also showed the first early pretertiary insect found in Colorado, discovered near Fairplay.

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [ ], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

Corrections of errors and notices of omissions are solicited.

Ila el Ali [*pseud.*]. Antwort auf die Bemerkungen gegen Ila el Ali. (Deutscher Bienenfreund, 15 April 1881, jahrg. 17, p. 119–121.)

Crit. rev., by Sauppe, entitled "Der cyprische Entscheidungskampf." (*op. cit.*, 15 May 1881, jahrg. 17, p. 154–156.)

Answer to Sauppe's "Der cyprische Entscheidungskampf" (*op. cit.*, 15 March 1881, jahrg. 17, p. 83–84) [Rec., 2876] in regard to the value of Cyprian bees. *G: D.* (2870)

Ila el Ali [*pseud.*]. *Apis dorsata.* (Deutscher Bienenfreund, 1 March 1881, jahrg. 17, p. 67.)

In regard to the search for *a. dorsata* and for *a. zonata*, in Batavia. *G: D.* (2871)

Ila el Ali [*pseud.*]. O, welche Waffen im cyprischen Entscheidungskampfe! (Deutscher Bienenfreund, 1 July 1881, jahrg. 17, p. 200–202.)

Crit. rev., by Sauppe, entitled, "Zum cyprischen Entscheidungskampfe, lieber Freund Lange." (*op. cit.*, 1 Aug. 1881, jahrg. 17, p. 234–237.)

Answer to Sauppe's "Der cyprische Entscheidungskampf" (*op. cit.*, 15 May 1881, jahrg. 17, p. 154–156) [Rec., 2877]. On Cyprian bees. *G: D.* (2872)

Krancher, Oskar Paul. Der Bau der Stigmen bei den Aculeaten, mit besonderer Berücksichtigung derjenigen von *apis mellifica.* (Deutscher Bienenfreund, Jan. 1882, jahrg. 18, p. 23–29, 1 fig.)

Stigmata of *aculeata*, especially those of *apis mellifica*, of which an abdominal stigma is figured; sounds produced by *a. mellifica.* *G: D.* (2873)

Krancher, Oskar Paul. Der Bau der Stigmen bei den Insekten. Inaugural-Dissertation zur Erlangung der Doktorwürde einer hohen philosophischen Facultät der Universität Leipzig. Mit 2 Tafeln. [Separat-Abdruck aus der Zeitschr. für wissensch. Zool., 1881, Bd. 35, S. 505–574, Taf. 28–29.] Leipzig, W. Engelmann, 1881. t.-p., p. 505–574 [+1], 23 × 14, t 18 × 10.6; 2 col. pl., 23 × 41.

Historical and general remarks upon the stigmata of insects and upon the apparatus which closes them; descriptions of these parts in species chosen from the different orders of insects. *G: D.* (2874)

Krancher, Oskar Paul. Die Thierstaaten bei den Insecten. (Deutscher Bienenfreund, 1881, jahrg. 17: 15 Aug., p. 243–246; 1 Sept., p. 260–264; 15 Sept., p. 274–278; 1 Oct., p. 289–291; 15 Oct., p. 305–309; 1 Nov., p. 321–325; 15 Nov., p. 338–340.)

Compilation on the social life of *bombus, vespa, polistes, formica, termes* and *apis.* *G: D.* (2875)

Sauppe, ——. Der cyprische Entscheidungskampf. (Deutscher Bienenfreund, 15 March 1881, jahrg. 17, p. 83–84.)

Crit. rev., by Ila el Ali [*pseud.*], entitled, "Antwort" . . . (*op. cit.*, 15 April 1881, jahrg. 17, p. 119–121.)

On the merits of Cyprian bees. *G: D.* (2876)

Sauppe, ——. Der cyprische Entscheidungskampf. (Deutscher Bienenfreund, 15 May 1881, jahrg. 17, p. 154–156.)

Crit. rev., by Ila el Ali [*pseud.*], entitled, "O, welche Waffen im cyprischen Entscheidungskampfe!" (*op. cit.*, 1 July 1881, jahrg. 17, p. 200–202.)

Crit. rev., by J. Stahala, entitled, "Meine Abschiedsworte nach dem cyprischen Kriege." (*op. cit.*, 1 July 1881, jahrg. 17, p. 202–206.)

Answer to Ila el Ali's "Antwort" . . . (*op. cit.*, 15 April 1881, jahrg. 17, p. 119–121) [Rec., 2870], on the merits of Cyprian bees. *G: D.* (2877)

Sauppe, ——. Zum cyprischen Entscheidungskampfe, lieber Freund Lange. (Deutscher Bienenfreund, 1 Aug. 1881, jahrg. 17, p. 234–237.)

Answer to J. Stahala's "Meine Abschiedsworte nach dem cyprischen Kriege" (*op. cit.*, 1 July 1881, jahrg. 17, p. 202–206) [Rec., 2879], and to Ila el Ali's "O, welche Waffen im cyprischen Entscheidungskampfe!" (*op. cit.*, 1 July 1881, jahrg. 17, p. 200–202) [Rec., 2872]. On merits of Cyprian bees. *G: D.* (2878)

Stahala, Joh. Meine Abschiedsworte nach dem cyprischen Kriege. (Deutscher Bienenfreund, 1 July 1881, jahrg. 17, p. 202–206.)

Crit. rev., by Sauppe, entitled "Zum cyprischen Entscheidungskampfe, lieber Freund Lange." (*op. cit.*, 1 Aug. 1881, jahrg. 17, p. 234–237.)

Answer to Sauppe's "Der cyprische Entscheidungskampf" (*op. cit.*, 15 May 1881, jahrg. 17, p. 154–156) [Rec., 2877]. On Cyprian bees. *G: D.* (2879)

ENTOMOLOGICAL ITEMS.

The minister of public works in Mexico has issued a circular encouraging silk growing in the republic.

The daily press for 11 Nov. 1882 reports serious complaints, from Mansorah, Egypt, of worms in the cotton.

Mr. J. A. Watson reports, in *The entomologist* for November 1882, a case of parthenogenesis in *Anarta myrtilli*, an English species of *noctuidae.*

Malebranche declares that he puts the observation of an insect above all the history of Greece and Rome.—*Barnard's Journ. of education*, v. 30, p. 721.

Mr. J. E. Taylor, in a note in *Nature*, 14 Sept. 1882, writes that he thinks the wings of *pterophoridae* mimic the down or pappi of the seeds of thistles or of other *compositae.*

Mr. Israel C. Carpenter, of Cherry Creek, Chautauqua Co., N. Y., has rendered a service to silk-growers in this country by manufacturing a good quality of perforated paper for use in transferring the worms from tray to tray.

We are glad to publish in this numero an article by one of our German subscribers, Dr. O. Krancher, and hope that other correspondents in foreign countries as well as at home will remember that Psyche is open to all communications of a like high class.

Mr. Chas. Spiess, apothecary, Porrentruy, Switzerland, would be glad to exchange coleoptera and lepidoptera of Europe, especially of Switzerland, for American and tropical coleoptera. Many alpine species for disposal, all in excellent condition. Please send lists of duplicates.

There has just been published an elaborate work on the present state of silk-worm culture in southern Russia and Trans-Caucasia, giving an accurate description of the whole of the culture, and a complete bibliography of works on the subject that have appeared since 1703. It is published in connection with the Moscow Exhibition, by the Moscow Agricultural Society, with many plates of drawings.—*Nature*, 7 Sept. 1882, p. 471.

Gehe's Trade-report for September notes that this year's (1882) crop of cantharides is reported to be much smaller than last year's, and, as only small quantities of last year's crop remain on hand the price is certain to rise. The crop of Dalmatian insect-powder flowers (*Pyrethrum*) has been very large this year, and as a large amount is still on hand from last year's crop and the demand is not very great, the price is likely to be lower than ever before.

The Leavenworth times tells a story which is calculated to shake the public faith in its truthfulness, to the effect that in blasting a large limestone rock at Emporia lately, a small cavity was disclosed which was found to contain a little worm apparently bleached white and lifeless. But it is now fast developing into a butterfly, is half an inch long, is of a brownish color and ribbed across the back, and "is doing some lively wiggling." The block of stone was quarried about 20 feet below the surface.—*Springfield* [Mass.] *daily republican*, 30 Sept. 1882.

The above nonsense, taken at random from a considerable number of equally absurd statements clipped from newspapers, convinces us that scientific editors are too little employed in this country. *G: D.*

At the October meeting of the Cambridge Entomological Club Mr. George Dimmock was elected secretary and Mr. B. Pickman Mann treasurer, Mr. William Trelease, the late secretary-treasurer, having resigned on account of his removal to Madison, Wisconsin. The election of a separate secretary and treasurer, instead of one person holding both offices as heretofore, will give these officers time to do much more for the Club. The Club will take steps toward increasing its activity and usefulness during 1883. Among other projects concerning which all the members will soon recieve circulars is the issuing of a printed annual report for 1882, which will contain the constitution, by-laws, list of members and of contributors to the Permanent Publication Fund, and many other matters of interest concerning the Club.

At the regular quarterly meeing of the Board of State Horticultural Commissioners of California, 28 Sept. 1882 . . . a communication was read from the Viticultural Commission recommending the Chief Executive Horticultural Officer Matthew Cooke] to enforce the necessary rules for the protection of trees from curculio and other noxious insects which may be introduced on nursery stock.

Mr. Cooke said that he had decided to enforce the horticulture laws, and to have inspectors appointed at Sacramento, Stockton, Los Angeles, Oakland and San Francisco to attend to and enforce the disinfection of all fruit trees imported during the ensuing year.

The Secretary [J: H. Wheeler] read a report on the codling moth [*Carpocapsa pomonella*] by Felix Gillet, of Nevada City, in which was detailed his successful conquest against this insect by the use of bands of cloth about the trees, to be removed and cleaned of insects lodging therein at stated periods, besides scraping and cleaning the trees well to destroy larvae and eggs. Mr. Gillet further reported on the successful use of sulpho-carbonate of potassium [K_2CS_3] in fighting the apple-tree root-louse [*Schizoneura lanigera*] on young trees and nursery stock.

Some discussion arose as to how often the bands or traps set for the larvae of the codling moth should be cleaned. Gillet's experience was that the worm developed in 15 days; Cooke's, 8 days; Dr. [S. F.] Chapin's, 19 days.

Mr. [C. H.] Dwinelle reported that efficient work was being done by Colonel Hollister, of Santa Barbara, in fighting the cottony cushion-scale, *Icerya purchasi*, with hot water. . . . —Modified from *Pacific rural press*, 7 Oct. 1882.

SOCIETY MEETINGS.

The regular meetings of the Cambridge Entomological Club will be held at 7.45 p. m., on the days following: —

13 Oct. 1882.
10 Nov. "
8 Dec. "
12 Jan. 1883.
9 Feb. "
9 Mar. 1883.
13 Apr. "
11 May "
8 June "

G: Dimmock, *Secretary*.

The New York Entomological Club meets twice monthly, except in June, July and August, but no special date is fixed for each meeting.

Henry Edwards, *Secretary*.

The regular meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following: —

25 Oct. 1882.
22 Nov. "
27 Dec. "
24 Jan. 1883.
28 Feb. 1883.
28 Mar. "
25 Apr. "
23 May "

Edward Burgess, *Secretary*.

The regular meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following: —

14 Oct. 1881.
11 Nov. "
9 Dec. "
13 Jan. 1882.
10 Feb. "
10 Mar. 1882.
14 Apr. "
12 May "
9 June "

James H. Ridings, *Recorder*.

The semi-annual meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following: —

12 Dec. 1881.
12 June 1882.

James H. Ridings, *Recording Secretary*.

The regular monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following: —

3 Oct. 1882.
7 Nov. "
5 Dec. "
9 Jan. 1883.
6 Feb. 1883.
6 Mar. "
3 Apr. "
1 May "

G: J. Bowles, *Secretary*.

The regular meetings of the Brooklyn Entomological Society will be held at 9 Broadway, Brooklyn, E. D., N. Y., on the days following:—

28 Oct. 1882.
25 Nov. "
30 Dec. "
27 Jan. 1883.
24 Feb. "
31 Mar. 1883.
28 Apr. "
26 May "
30 June "

F. G. Schaupp, *Secretary*.

No. 98 was issued 13 Oct. 1882.

PSYCHE,

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

[Established in 1874.]

EDITED BY

G: Dimmock, *Cambridge, Mass.;* B: Pickman Mann, *Washington, D. C.;*
Albert J: Cook, *Lansing, Mich.;* Clifford Chase Eaton, *Cambridge, Mass.;* Francis Huntington Snow, *Lawrence, Kansas;*

WITH THE ASSISTANCE OF

W: Barnes, H: Edwards, Roland Hayward, S: Henshaw, H: Albert Robin, Frank G: Schaupp, S: Hubbard Scudder, Roland Thaxter, W: Trelease, H: Ward Turner, Joseph Martin Wilson.

Vol. 3. No. 100.

August 1882.

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Cambridge, Mass., U. S. A.: Published by George Dimmock.

YEARLY SUBSCRIPTIONS, $2. MONTHLY NUMEROS, 20 c.

[Entered as second class mail matter.]

PSYCHE, Organ of the Cambridge Entomological Club.

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EARLY STAGES OF BUTTERFLIES WANTED

The undersigned desires to obtain, by exchange or otherwise, from all parts of the world, eggs, caterpillars and chrysalids of Diurnal Lepidoptera. Dried specimens are preferred, especially of caterpillars, which should be prepared by inflation. Correspondence is invited with persons engaged in the study of the early stages of butterflies.

S. H. SCUDDER,
Cambridge, Mass.

COCCIDAE WANTED.

The undersigned is desirous of obtaining by exchange or otherwise specimens of as many species of the COCCIDAE as possible, for the purpose of making a study of the North American forms. Those found infesting cultivated plants especially desired. Living specimens preferred when they can be obtained.

J. HENRY COMSTOCK,
Department of Entomology,
The Cornell University,
Ithaca, N. Y.

GALLS AND GALL INSECTS.

The undersigned desires, either by exchange or otherwise, Galls from all parts of the United States. He is especially interested in those made by *Lepidoptera, Coleoptera, Homoptera* and *Diptera*. Correspondence in reference to Gall growths, or other vegetable abnormities, is invited.

CHARLES V. RILEY,
1700 Thirteenth St., N. W.,
Washington, D. C.

TORTRICIDAE WANTED.

I am desirous of obtaining as many North American TORTRICIDAE as possible, for the purpose of studying this family. I shall be glad to name and return any TORTRICIDAE forwarded to me for this purpose, save such as may prove new and desirable to retain for description.

Pack carefully, and direct to
PROF. C. H. FERNALD, Orono, Me.

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Living cocoons, pupae and ova of American lepidoptera bought or exchanged for other species, by Monsieur ALFRED WAILLY, (Membre-Lauréat de la Société d'Acclimatation de France),
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Kingston-on-Thames, England.

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S. STEBBINS, Springfield, Mass.

PSYCHE.

PNEUMATIC FUNCTIONS OF INSECTS.

BY GEORGE MACLOSKIE, PRINCETON, N. J.

When handling the larva of a dragonfly (*Libellula*) which had lain in a solution of caustic potash, I found that squeezing the thorax protruded the proboscis. On removing the pressure, the proboscis folded itself by its elasticity, and returned to its mask-like condition of rest. The experiment could be repeated indefinitely, just as we extend and retract a pair of lazy-tongs. The muscles having been destroyed in these specimens, the movements were purely mechanical, depending on air-pressure and the elasticity of the chitinous membranes. In the fresh specimens similar pressure of the thorax (and in less degree pressure of the abdomen) both protrudes the proboscis and swells its base with air. A cushion in the flexor-side of the angle of the proboscis is much inflated, and on pricking it with a needle it collapses and the power of protrusion is almost destroyed. The proboscis has at its tip muscles for abducting and adducting the terminal lobes relatively to each other; near the base it has a few muscles for guiding and aiding its movements. It is richly supplied with tracheae, and thus is in direct communication with the pneumatic system of the head and thorax. It is surprising that neither Réaumur, nor Léon Dufour, nor the other investigators who made this larva a subject of special study, detected its mode of protruding the proboscis, a matter of easy observation.

The pneumatic function here observed is like that which I have formerly described in the house-fly,[1] and which has been since confirmed by Dimmock.[2] Other instances of the same class have since come to our knowledge.

Gegenbaur ascribes to the abdomen of these larvae a "branchial movement concurring with a natatory movement."[3] Packard speaks of a "hydrostatic" function in the larva of *Corydalis*.[4] Réaumur watched the backward flow of water from the anus of the larvae of libellulids, and stated that it aids in propelling the animal (a view which has been repeated by others; but the main organs of propulsion are the nimble limbs). Dufour admired the structure of their pneumatic branchiae as the most beautiful objects he had ever observed, giving a good account of the mechanism for working them,[5] but he stopped short of what seems to me the most interesting part.

In the thorax are six tracheal trunks, of which the two dorsal ones are exceedingly large, and with few branches save at their anterior and posterior extremities; two others are smaller, line the alimentary tract, and supply it with many branches; the remaining two are very small and adjoin the ventral nerve-cord. The large pair (which we may call the *pneumatic tracheal trunks*) suddenly gives out a crowd of branches in the abdomen, which subdivide again and again, breaking up into a spray of fine filaments which supply the branchial organs.

---

[1] Amer. Naturalist, March 1880, v. 14, p. 157.

[2] The anatomy of the mouth-parts . . . of some diptera. Dissertation . . . Leipzig University. Boston, Williams, 1881.

[3] Manuel d'anat. comparée, Paris, 1874, § 138.

[4] Amer. naturalist, Sept. 1874, v. 8, p. 533.

[5] Ann. des sci. nat., zool., 1852, v. 17, p. 65–100.

The branchiae consist of a dozen longitudinal columns around the rectum, each bearing about thirty-five pairs of oval branchial leaflets, pinnately arranged and imbricating over each other. Each leaflet receives about two hundred very delicate filaments from the tracheal branchlets; the filaments are attenuated towards their extremity and end caecally in the sac-like leaflet. Dufour found (in *Aeschna*) that the leaflets are enclosed in pockets or involutions of the intestinal wall; in *Libellula* they seem to lie loosely in the rectal cavity.

The larva respires by drawing in through the anus a gentle flow of water, which it then expels with force, driving the exhausted water and contained impurities to a safe distance. The inflow and outflow may occur about fifty times per minute; and occasionally the process will stop for a while, especially when the larva is at rest. There are sphincter valves at the anus and muscles for regulating the opening and closing of the anal lobes and armature, and a ganglionic enlargement to supply this. But there are no large muscles about the branchiae and no large ganglia in the abdomen to suggest special muscular action. The muscles which line the abdominal wall regulate the respiration. By relaxing they permit the abdomen to expand, causing a partial vacuum: then the water flows gently in, and the air flows from the pneumatic tracheal trunks into the many thousands of filaments which crowd the branchial leaflets. This action may be aided by pressure in the front part of the body which drives the air to the rear; and the pneumatic pressure in the tracheae swells the delicate filaments and the enclosing branchial leaflets simultaneously with the incoming tide of water. The fine membrane permits the passage of gases, but not of the water. The contraction of the abdominal muscles by reducing the vacuum expels both air and water from the branchial region, driving the air forward to the tracheal system. In a specimen imprisoned with water in a glass tube we found that four air-bubbles were expelled with the outgoing tide of water in as many minutes (a result of excitement). Thus the mechanical principle is nearly the same as in lung-respiration. The simultaneous inflow of air and of a fluid follows the expansion of the body-wall, and the contraction of the wall induces a reciprocal outflow. In the insect the fluid comes from without, the air from within; in the air-breathing vertebrate the air comes from without, and the fluid (blood) from the system, being aided in its progress by the heart.[6] Cutting through the abdominal wall of the larva has the same effect as piercing the human pleura, causing the respiratory organs to collapse and stopping their function. If we prevent the expansion of the abdomen of the larva, breathing is temporarily arrested.

M. Jousset de Bellesme[7] discovered that the larval dragon-fly swells out into its adult form by a process which is a kind of pneumatic efflation. The pressure of air from within gives definite form to the body; puffs up the forehead into soft bladder-like bumps, and swells out the wings like soap-bubbles, until the two sides come together and harden into the fine wing-membrane with its double plate and enclosed tracheae. This shows the insect's wing to be merely an outgrowth (exodeme) of its body-wall like the pleura of a lobster.

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[6] Foster's Physiology, 1880, 4th edit., book 2, chap. 2, § 7.

[7] Harper's Annual rec. of sci. . . . 1878, p. 447.

The scale-like larva of the beetle *Psephenus* (once described as a crustacean, *Fluvicola*) which abounds on the loose rocks in our streams, has brush-like tracheal filaments (external to its abdomen) which sweep the water of its oxygen, and may be observed swelling out and "kicking" at every pulsation; a result of pneumatic pressure within the body.

Réaumur observed that young flies can at will inflate a sac on their foreheads, expanding and contracting it. Weismann, in his study of the embryology of diptera, made an observation which seem to me to belong to the same category.[8] The jaws of diptera arise far back in the body, projecting like limbs, before the true limbs show themselves. Subsequently the jaws travel headwards, become directed forwards instead of transversely, and sink out of sight within the oral cavity which is now formed by invagination. Then the head itself is swallowed up in the trunk, being lost to view, and thus we have the well-known headless maggot of these insects. In the subsequent growth of the head-parts this author thinks that there is a complete discontinuity between the larva and the adult, a histolysis or disintegration of the tissues, which must make a new departure in order to continue their growth. Balfour suggests that, instead of a complete break, we may have here only a skipping of intermediate stages. The rule of embryo-life is that when a part has a long journey before it to reach high organization, it starts early, takes all short cuts, and does not delay at the "way-stations." My own observations point to the conclusion that the fine chitinous frame-work and ledges of the introverted head of the larval fly fairly forecast the characteristic structures of the adult, and that the plates of the basi-proboscis occupy in the larva the normal place of an endocranium (with which I deem them homologous).[9] Weismann states that he was unable to trace the development of these parts, because the head was invisible; and hence he could not work out their homologies.

He found, however, that the head came forth to view again from its introverted position by the influence of mechanical pressure. The abdomen contracts, and this drives the contents of the body forwards so as to eject the head. He specifies only the *fluid* contents; but whatever operates on them must *a fortiori* set in motion the pneumatic dynamics of the tracheae which are then distended with air and largely developed towards the head. Hence the whole head is, in the first instance, driven out by the same aerial impulse which subsequently inflates the frontal sac and propels the proboscis.

The same authority states that the fine branches of tracheae in the system terminate in spindle-cells with thin elastic intima. Is it not possible that tracheal pressure may distend these cells like bladders, and thus facilitate the aeration of the tissues? The conditions for their distention seem to be present at every pulsation, though under dissection they are always collapsed. I have found such terminal enlargements of the tracheae numerously developed in the disti-proboscis of the house-fly. On one occasion I got a fly in a live-cage with the tip of its proboscis pressing the cover-glass; and by focussing the microscope on this, I found that with every pulsation there was a circle of flashing lights along the margin of the proboscis, as if air was rhythmically injected into such sacs. It is easy to understand how such distension would promote the function of the tracheae as carriers of gases between the tissues and the outer world.

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[8] Zeitschr. f. wiss. Zool., 1863, 1864 and 1866; bd. 13, 14 and 16.

[9] Amer. naturalist, March 1880, v. 14, p. 160.

Princeton, 24 Nov. 1882.

CLUSTER-FLIES.

BY BENJAMIN PICKMAN MANN, WASHINGTON, D. C.

At a meeting of the Biological society of Washington, held 13 Oct. 1882, Mr. W: H. Dall exhibited specimens of flies which had been sent him from New York state with an account of their habit of congregating in large numbers in unused apartments of houses, under table-cloths, in pillow-cases, and wherever similar snug places of concealment could be found. These flies were found from late fall until late spring in such situations, but during the summer they disappeared. Specimens were put into the hands of Dr. C: V. Riley, who made a communication upon them at the meeting of the same society, 10 Nov. 1882, dwelling upon the difficulty of identifying the species of the fly and stating that it was the *Pollenia rudis*, described by T. W: Harris as *Musca familiaris*, and making further remarks upon the synonymy. At this meeting Mr. Dall read a letter, received since the presentation of his first communication, from the parties who had sent the specimens, giving a highly colored account of the actions of the flies. Dr. Frank Baker made a more rational statement in regard to the occurrence of flies in Maine, which were probably of the same species, and had similar habits. Dr. Baker stated that as many of the people in Maine still kept up the custom of the home-production of yarns and spun goods, and these goods, of loose texture, retained upon them a considerable quantity of their natural grease, the flies were in the habit of burrowing into such goods, to feed on the grease, and were supposed to cut the fibres. Dr. Riley did not seem to credit the flies with this habit, but there seems to be no reason to doubt the possibility of such injury, and not much improbability about it. The flies were stated to attach themselves sometimes in clusters suspended from ceilings and other supports, and were on this account called "cluster-flies." Mr. Dall's informant stated that the flies were proof, at least to a great extent, against the influence of pyrethrum powder, but Dr. Baker said that if the powder was diffused in an apartment, and the flies were then caused to bestir themselves, and to fly about, they succumbed to the influence of the powder as readily as other flies. Such a difference in observations is not surprising, for it may be observed in other insects that when they are sluggish or at rest they are not so readily affected by medicinal agencies as when in a state of motion or excitement.

I remember that, during one or two years, at a certain season, which, as far as my recollection serves me, was in April, I noticed numerous specimens of *Microdon globosus*, a syrphid fly, issue from a nail-hole in the plastered wall of an apartment in a dwelling-house, as though the flies had passed the winter within the walls of the house. Numerous instances, which will occur to experienced entomologists, might be cited of the congregation of winged insects in sheltered situations for the purpose of hibernation, this habit being only a modification of the general habit in hibernating insects to seek a place for individual shelter.

Washington, 11 Nov. 1882.

PROMOTING LOCUST RAVAGES.

BY BENJAMIN PICKMAN MANN, WASHINGTON, D. C.

It is well established that the year 1874 was characterized in the state of Kansas by the most extensive ravages of the so-called Rocky Mountain locust, *Caloptenus spretus*, which insects flew into the state from the west and the north, and stripped large areas bare of vegetation. The devastation in that year occurred principally in the western and central portions of the state, but, as Dr. C. V. Riley says in his 8th report as state entomologist of Missouri, "the greatest bulk of the eggs were [was] laid as the locusts approached the eastern limits of the state." In 1875 "the damage done was by the young locusts, which hatched in enormous numbers in the eastern part of the state."

The purpose of this note is that I may publish a communication sent to me by Mr. J. P. Brown, formerly, for twelve years, a resident of eastern Kansas, from which state he removed, discouraged by the ravages of the locusts, in the fall of 1875. This communication explains sufficiently at least one of the causes of the enormous prevalence of young locusts in that state, in 1875. A similar showing has already been made for the state of Nebraska by Prof. S. Aughey in the 1st report of the U. S. entomological commission. Mr. Brown says:—

"After a twelve year's residence in eastern Kansas, I left that excellent state in the fall of 1875.

"After raising a fine crop of corn and seeing it destroyed by the locusts before it was ripe, or advanced sufficiently for gathering, I was, in common with many thousand others, much discouraged.

"Settlers who had lost all their crops, with very little to subsist upon, found it necessary to hunt prairie chickens, and to sell them for the necessaries of life, and many, for sport as well, made a business during the entire winter of killing and shipping not only prairie chickens, but also quails and other birds.

"I took pains to gather from commission merchants of Leavenworth, Kans., and of Kansas City and St. Joseph, Mo., and from the express companies, such data as I could at the time, and estimated that during the winter of 1874 the enormous quantity of 1000 car-loads of birds were destroyed and shipped to eastern markets from points west of Saint Louis, Mo.

"The next spring, when the eggs of the locusts began to hatch out, it was discovered, too late, that there were no birds to devour the insects that were so rapidly growing, and must subsist upon the crops until able to fly to other localities.

"It is safe to estimate that a gill [about 0.12 litre] of young locusts, from one day to two weeks old, will number 1000. Yet a gill would be a small day's ration for a prairie fowl, or half that amount for a quail. It can readily be seen that these young insects, no larger when first hatched than a grain of rye would soon have been exterminated had that quantity of birds been preserved for the purpose; instead of which, from an apparent necessity, the birds were destroyed and consequently the total crops of the state of Kansas and western Missouri, Nebraska and part of Iowa were also destroyed.

"Is it not time some protection was afforded these feathered friends? B."

ON A HABIT OF *SCOLOPENDRA MORSITANS.*

BY GEORGE DIMMOCK, CAMBRIDGE, MASS.

The note by Mr. J. W. Freese, on page 290 of the present volume of PSYCHE, upon the habit observed in a species of *Phalangium*, or harvest-man, of putting a wounded part of its leg to its mouth, reminds me of an analogous habit of *Scolopendra morsitans*.

Last March, while at Banyuls-sur-mer, in the eastern Pyrenees, I took advantage of the abundance of *S. morsitans* in that region to see what would be the result of combats between that poisonous myriapod and *Buthus occitanus*, a scorpion not rare in the same region. Without detailing their mode of fighting it suffices to say here that the *Scolopendra* was usually badly lacerated by the violent strokes of the sting of the *Buthus*, the latter animal always being victor. After receiving a stroke from the scorpion the myriapod immediately, in fact with apparent haste, began working at the wound with its mouth-parts, seeming to eat the fluids exuded from its body. For a time the legs of the myriapod were paralyzed near the wound, the scorpion's poison apparently acting on the neighboring nervous centers, but in a few minutes the myriapod recovered the use of its legs, and was only killed after repeated serious tearing of its body by the scorpion's sting.

It is possible that the *Scolopendra* transfers much of the scorpion's poison from the wounds to its stomach, or even that some curative fluid is poured upon them to neutralize the scorpion's poison, but it seems more likely that the process is one of simple cleaning such as the *Scolopendra* would employ if any extraneous matter was put upon the surface of its body, the pain of the wounds only serving to direct immediate attention to them. The same result would probably follow the application of any irritant upon the *Scolopendra*, and with less rapidity if any viscid fluid was daubed upon its body. Many mandibulate insects cleanse their limbs with their mouth-parts, and I have often seen *Scolopendra* use its mouth-parts to clean its antennae, legs, and the surface of its body.

Cambridge, 27 Nov. 1882.

PSYCHE.

CAMBRIDGE, MASS., AUGUST 1882.

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CORRESPONDENCE.

HABITS OF THRIPS.

In a communication, in *Psyche*, vol. 3, p. 369, Mr. Herbert Osborn gives some interesting observations on the habits of a certain undescribed species of *Phloeothrips* which he found in abundance in all the fruit blossoms which he examined, stating that they were doing much damage to the tender styles by biting and puncturing them and preventing thereby the fertilization of the ovaries.

Taking it for granted that *Thrips* really does all the damage ascribed to it, it remains as a rather singular fact that, notwithstanding the great abundance of *Thrips* in all kinds of flowers, the yield of good and numerous seeds is not materially diminished. I am therefore of opinion that, although the *Thrips* may somewhat injure the styles and other parts of the plants, they mainly gather the nectar which is more or less excreted, and while actively running about assist in fertilizing, as more or less of the pollen will adhere to their feet and body and doubtless will be carried to the stigma.

That many species of *Thrips* are vegetable feeders, in some of their stages, has long been well known, and I have seen numerous species on all kinds and all parts of plants, and some of these *Thrips* I have seen in the act of feeding, but I have also observed that not all species have entirely the same habit; and that some, in one stage or another, are carnivorous. Especially have I noticed this to be the case with a species which is frequently found upon the leaves of *Platanus* and upon other plants which are badly infested with *Tetranychus telarius* upon the adult and young and probably also upon the eggs of which this *Thrips* feeds.

It may also turn out that two or three species which swarm in great numbers in the blossoms of clover (which are usually full of the eggs and larvae of *Cecidomyia leguminicola*) are partially carnivorous, and further observations may prove that they mainly search and feed upon the *Cecidomyia*.

I may also mention here that this year, as late as 14 November, after several quite cold days, I found for the first time *Heliothrips haemorrhoidalis*, Bouché, on apple-leaves in the orchard of the U. S. Department of Agriculture, as lively and active as in hot-houses, where this species was only observed previously.

I may also mention the presence of *Heliothrips dracaenae*, Heg., in the conservatory of the Department of Agriculture, an insect which is reported as doing immense damage to dracaenas in hot-houses in different parts of Europe.

Theodor Pergande.

Washington, D. C., 15 Nov. 1882.

BOOK NOTICE.

It cannot fail to give pleasure to naturalists to learn that Dr. W. H. Müller, son of Dr. Hermann Müller, of Lippstadt, Germany, has begun a course of observation and study in a line of thought similar to that which has made his father's name and works so well known to students of evolution.

Dr. W. H. Müller has just published his dissertation for obtaining the philosophical doctorate at the university of Jena. In the dissertation [PSYCHE, Rec., 2891], which is entitled "Proterandrie der Bienen," the author shows, by careful observations most of which were made without reference to the subject of which the dissertation treats, that proterandry, or the appearance of the males earlier in the season than the females, exists in all the chief groups of bees with the exception of the social bees. Dr. Müller proposes to leave the consideration of the more complex question of proterandry among social bees for special treatment later, but he writes now that he is convinced that among all bees the males regularly outstrip the females somewhat in development. *G: D.*

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [ ], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

Corrections of errors and notices of omissions are solicited.

Bell, James Thompson. Collection notes for 1880. (Can. entom., March 1881, v. 13, p. 58–60.)

Crit. notice by J: L. LeConte. (Can. entom., April 1881, v. 13, p. 80.)

Notes of new captures around Belleville, Ontario, Canada; mostly coleoptera. *G: D.* (2880)

Hubbard, H: Guernsey. Description of the larva of *micromalthus debilis*, Lec. (Proc. Amer. philos. soc., 18 April 1878, v. 17, p. 666–668, pl. 4.)

Larva found in the soft crumbling wood of an old log at Detroit, Mich. Imago, larva, and magnified parts figured. Article incorporated with J: L. LeConte's "The coleoptera of Michigan" . . . [Rec., 2889]. *H: W. T.* (2881)

Hubbard, H: Guernsey *and* Eugene Amandus **Schwarz.** Contribution to a list of the coleoptera of the lower peninsula of Michigan. (Proc. Amer. philos. soc., 18 April 1878, v. 17, p. 643–666.)

Locality of capture noted in most cases. Article incorporated with J: L. LeConte's "The coleoptera of Michigan" . . . [Rec., 2889]. *H: W. T.* (2882)

Hubbard, H: Guernsey *and* Eugene Amandus **Schwarz.** List of coleoptera found in the Lake Superior region [of Michigan]. (Proc. Amer. philos. soc., 18 April 1878, v. 17, p. 627–643.)

Locality of capture noted in most cases. Article incorporated with J: L. LeConte's "The coleoptera of Michigan" . . . [Rec., 2889]. *H: W. T.* (2883)

Huber, L. Kunsthonig. (Deutscher Bienenfreund, 15 Aug. 1881, jahrg. 17, p. 247.)

Inquiries in regard to American artificial honey in the comb. *G: D.* (2884)

Insect powder. (New remedies, July 1881, v. 10, p. 221, 3 cm.)

Sources of *chrysanthemum* and *pyrethrum* powder. *G: D.* (2885)

Johnson, James Smith. Early appearance of catocalas. (Can. entom., July 1880, v. 12, p. 137–138.)

Notes on the first species of *catocala* that appear each season, about Philadelphia, Pa., and the number of individuals of each species taken. *G: D.* (2886)

Kellicott, D: Simons. Notes on *aegeria pini*. (Can. entom., Aug. 1881, v. 13, p. 157.)

Differences between the sexes; length of time employed by *a. pini* in passing through its different transformations. *A. K. D.* (2887)

Le Conte, J: Lawrence. [On *alaus gorgops*.] (Can. entom., April 1881, v. 13, p. 80.)

Answer, by J. T. Bell, entitled "[On *alaus*]." (Can. entom., May 1881, v. 13, p. 116.)

Thinks that the *a. gorgops* recorded from Canada in J. T. Bell's "Collection notes for 1880" (Can. entom., March 1881, v. 13, p. 58–60) [Rec., 2880] must be *a. oculatus*. *G: D.* (2888)

Le Conte, J: Lawrence. The coleoptera of Michigan; descriptions of new species. (Proc. Amer. philos. soc., 18 April 1878, v. 17, p. 593–626, 669.)

Describes the three new genera *odontosphindus* and *eurysphindus* [*cioidae*], and *micromalthus* [*lymexylidae*], and 67 new species, belonging to the genera *dyschirius, badister, bembidium, hydroporus, suphis, laccophilus, gaurodytes, hydrobius, habrocerus?, agathidium, batrisus, orthoperus, lathridius, odontosphindus, eurysphindus, mycetophagus, diplocoelus, rhizophagus, pedilophorus, paromalus, hetaerius, aegialia, phausis, xyletinus, micromalthus, phymatodes, typocerus, chlamys, phyllotreta, chaetocnema, mycetochares, canifa, dircaea, hallomenus, orchestes, zygobaris, pityophthorus, xyleborus, xylocleptes, tomicus, micracis, choragus*; gives synoptic tables of the genera *mycetophagus, diplocoelus, litargus, triphyllus, aegialia, mycetochares, hallomenus* and *orchestes*; the descriptions of 7 new species and the tables of *mycetophagidae* and *orchestes* by G: H: Horn. Notes on about 25 other species. Some of the species are from other parts of North America. Index to species (p. 669). The following papers are incorporated with this: — Hubbard, H: G. *and* E. A. Schwarz, List of coleoptera found in the Lake Superior region [Rec., 2883] (p. 627–643); *ibid.*, Contribution to a list of the coleoptera of the lower peninsula of Michigan [Rec., 2882] (p. 643–666); Hubbard, H: G., Description of the larva of *micromalthus debilis*, LeC. [Rec., 2881] (p. 666–668, pl. 4). *H: W. T., E. A. S., B: P. M.* (2889)

Le Conte, J: Lawrence. Fungoid diseases of insects: — a reclamation. (Can. entom., July 1880, v. 12, p. 126–128.)

Discusses the origin of the idea of using fungoid diseases as a means of destroying injurious insects. *G: D.* (2890)

Müller, W. H. Proterandrie der Bienen. Inaugural-Dissertation zur Erlangung der philosophischen Doctorwürde der hohen philosophischen Facultät der Universität Jena. Leignitz, 1882. 44 [+ 1] p., 21 × 13, t 16.5 × 9.

Notice, by G: Dimmock. (Psyche, Aug. 1882 [Jan. 1883], v. 3, p. 381.)

Observations on proterandry of bees; chiefly on the genera *prosopis, halictus, andrena, colletes, dasypoda, panurgus, eucera, anthophora, chalicodoma, megachile, osmia, anthidium, chelostoma* and *coelioxys*. Conclusions drawn from the observations. Literature used (5 titles). *G: D.* (2891)

ENTOMOLOGICAL ITEMS.

Attention is called to the change in price of subscription to Psyche as further explained on page 374.

Mr. E. A. Fitch showed, at the meeting of the Entomological society of London, 5 July 1882, two ichneumons the larvae of which are parasitic on spiders.

Prof. E. T. Owen, of Madison, Dane Co., Wisc., asks persons who have lepidoptera to sell to send him, with prices stated, their lists of specimens for sale.

Mr. Alfred Wailly (formerly at 110 Clapham Road, London, Eng.) wishes us to make known his change of residence to Tudor Villa, Tudor Road, Norbiton, Kingston-on-Thames (Surrey), England.

Mr. R. A. Fraser has lately bred a fine hermaphrodite of *Lasiocampa trifolii*, an English species. Mr. Frazer gives a brief description of the hermaphrodite in the *Entomologist's monthly magazine* for October 1882.

Dr. Julius Friedländer, head of the firm R. Friedländer & Sohn, Berlin, Prussia, died 4 Nov. 1882. The firm, well-known to Americans as dealers in scientific books, will continue the business at their old place.

A species of *ephemeridae*, probably *Teloganodes tristis*, from Ceylon, is said to be luminous by Mr. G. Lewis, who sent a specimen for exhibition before the Entomological society of London, 5 July 1882. According to Mr. Lewis the whole abdomen of the insect is luminous.

Dr. Max Weber has found that a myriapod, a species of *fontaria*, emits a secretion containing hydrocyanic acid (HCN). This is an interesting addition to the list of acids, formic, butyric, salicylic, cimicic and others, already known to be found in secretions of arthropods.

Mr. Theodore Jaensch, Moritzstrasse 7, Breslau, Germany, desires to obtain, either by purchase or in exchange for European and exotic species, fertile eggs, and living chrysalids or cocoons of all sorts of American lepidoptera, even of the commonest species. *Sphingidae*, *bombycidae* and *catocalidae* are particularly desired.

The annual meeting of the Entomological society of Ontario was held at Montreal, P. Q., on the 24th of August this year, in consideration of the meeting of the American association for the advancement of science at that place at the time. The former officers, with one minor exception, were re-elected to serve for the ensuing year.

M. Rafford, of the *Société d'horticulture de Limoges*, has observed that the leaves of the castor-oil plant (*Ricinus communis*) emit an essential oil or some toxic principle which possesses strong insecticide qualities, so that on being placed in a room infested with flies the flies were found dead lying on the floor beneath the plant or hanging from the under surface of the leaves.

Dr. Wm. A. Nason, of Algonquin, McHenry Co., Illinois, offers for sale his collections in natural history, consisting of insects (over 3000 species of coleoptera, besides diptera, hymenoptera and nocturnal lepidoptera), plants, shells and fossils, the result of over fifteen years' study and collection, and embracing large lots purchased from local collectors, besides extensive exchanges.

At a meeting of the entomologists who were in attendance at the meeting of the American association for the advancement of science on the 24th of August, this year, at Montreal, it was voted that Mr. J. A. Lintner should be requested to have a meeting of entomologists called next year on the day preceding the meeting of the A. A. A. S., at the place where the association should meet.

At the meeting of the Paris Academy on Monday M. Dumas stated that at the very beginning of its work, the Academical commission for the destruction of the phylloxera proposed to arrange for the immediate destruction by fire of each plant proved to be infested. Objections were made to this scheme grounded on the state of French legislation on rural property, and the Academical commission desisted. M. Dumas states that he has in hand an official report from Switzerland establishing the soundness of the views taken by the Academy on this important question. The cantons of Geneva, Vaud and Lucerne having resorted to the destroying process, all the vines, of which the value exceeds 40,000,000 *l.*, had been saved at the expense of a few thousand pounds. A special tax had been imposed on the proprietors of vines for compensation to the owners of the destroyed plants.—*Nature*, 23 Nov. 1882, v. 27, p. 89.

A review of Rev. J. G. Wood's "Common British Insects," in *Nature* for 7 Dec. 1882, closes with these sensible remarks:

"The real point at issue in connection with books of this nature is their effect. They are eminently rudimentary, and not elevating. Let us take instances from the book now under review. At p. 14, after an explanation of the terminology of the external skeleton of a beetle, we read: — 'At first some of these terms may appear to be harsh, repulsive, and difficult to master. In reality they are not so, and a knowledge of them is absolutely necessary to any one who wishes to understand the description of an insect.' This is a very sensible remark. Yet throughout the book the utmost favor is bestowed upon absurd meaningless 'English' names. The culminating point of absurdity is reached at p. 276. Amongst the small moths the author 'figures' one (under a misspelt generic name), and because it (out of several hundred other fortunate little moths) has received no 'popular' name, he terms it the '*Brown Dolly*'!"

Remarks of similar import to the above would apply to several American works by more or less scientific writers. *G: D.*

SOCIETY MEETINGS.

The regular meetings of the Cambridge Entomological Club will be held at 7.45 p. m., on the days following: —

13 Oct. 1882.
10 Nov. "
8 Dec. "
12 Jan. 1883.
9 Feb. "
9 Mar. 1883.
13 Apr. "
11 May "
8 June "

G: Dimmock, *Secretary.*

The New York Entomological Club meets twice monthly, except in June, July and August, but no special date is fixed for each meeting.

Henry Edwards, *Secretary.*

The regular meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p.m., on the days following: —

25 Oct. 1882.
22 Nov. "
27 Dec. "
24 Jan. 1883.
28 Feb. 1883.
28 Mar. "
25 Apr. "
23 May "

Edward Burgess, *Secretary.*

The regular meetings of the Entomologica. Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following: —

14 Oct. 1881.
11 Nov. "
9 Dec. "
13 Jan. 1882.
10 Feb. "
10 Mar. 1882.
14 Apr. "
12 May "
9 June "

James H. Ridings, *Recorder.*

The semi-annual meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following: —

12 Dec. 1881.
12 June 1882.

James H. Ridings, *Recording Secretary.*

The regular monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following: —

3 Oct. 1882.
7 Nov. "
5 Dec. "
9 Jan. 1883.
6 Feb. 1883.
6 Mar. "
3 Apr. "
1 May "

G: J. Bowles, *Secretary.*

The regular meetings of the Brooklyn Entomological Society will be held at 9 Broadway, Brooklyn, E. D., N. Y., on the days following:—

28 Oct. 1882.
25 Nov. "
30 Dec. "
27 Jan 1883.
24 Feb. "
31 Mar. 1883.
28 Apr. "
26 May "
30 June "

F. G. Schaupp, *Secretary.*

No. 99 was issued 16 Dec. 1882.

PSYCHE,

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

[Established in 1874.]

EDITED BY

G: Dimmock, *Cambridge, Mass.;* B: Pickman Mann, *Washington, D.C.;* Albert J: Cook, *Lansing, Mich.;* Clifford Chase Eaton, *Cambridge, Mass.;* Francis Huntington Snow, *Lawrence, Kansas.*

with the assistance of

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Vol. 3. No. 101-102.

September–October 1882.

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Cambridge, Mass., U. S. A.: Published by George Dimmock.

YEARLY SUBSCRIPTIONS, $1. MONTHLY NUMEROS, 15 c.

[Entered as second class mail matter.]

PSYCHE, Organ of the Cambridge Entomological Club.

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Department of Entomology,
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PSYCHE.

ON SOME GLANDS WHICH OPEN EXTERNALLY ON INSECTS.

BY GEORGE DIMMOCK, CAMBRIDGE, MASS.

The following paper consists, for the most part, of compiled material brought into connected form in consequence of ideas suggested to me in studying odoriferous glands of the larvae of *Attacus cecropia*, to which I have already called the attention of the Cambridge Entomological Club, at its meeting of 13 Oct. 1882. Since that time I have made sections of the above-mentioned glands of *Attacus cecropia*, and of those which I found later in the larvae of a pterophorid, *Aciptilus lobidactylus;* the glands of the larvae of these two species have furnished the original descriptive matter of this paper.

The peculiar odor of the larvae of *Attacus cecropia*, when they are roughly handled, has probably escaped the notice of but few persons who have reared these moths through their larval stages. If a larva be examined carefully the black spines upon its red, blue, and yellow knobs, or tubercles, will be seen to break easily from the tubercle, and a clear yellow fluid of disagreeable odor to ooze from each opening left by the injury. By crushing the tubercle with a pair of forceps the same strong odor is very noticeable, and by this mode of treatment one has no difficulty in proving that each tubercle, small or large, — blue, yellow or red,— contains the odorous fluid. The red tubercles are seen, in sections cut with the microtome, to be divided into compartments, the cavities of each spine opening into a compartment at its basal end. The spines themselves are quite rigid and very brittle, so that they break away at a slight touch and leave a hole in the tubercle, out of which the odorous fluid pours, pushed by internal pressure. This fluid, which I have not examined carefully, but which I hope later to study chemically, is strongly acid to litmus paper, but causes a purple precipitate in carmin solutions. Larvae of *Attacus cecropia* are provided with these glands and the odorous fluid as early as the third larval stage—perhaps earlier—and apparently shed the glands in the tubercles when moulting the last larval skin in order to enter the pupal state.

The odor given out by the glands of the larvae of *Attacus cecropia* suggests at once their protective function, and, after having watched a sparrow (*Passer domesticus*) drag a sphingid larva about, seizing it usually by the horn, it seemed likely to me that the disagreeable acid fluid in the tubercles of the larva of *Attacus cecropia* was a protection to the larva from similar rough treatment.

Having found these interesting glands on the larvae of *Attacus cecropia*, glands concerning which I can find no mention in entomological literature, my attention was drawn further to the subject of external glands of insects, many of which are protective or defensive in function.

Glands similar to those of the larva of *Attacus cecropia*, in that they have no outlet until one is produced by external agency, are not rare in the larvae of *bombycidae*. The severe poisoning produced by the hairs of certain larvae of *bombycidae*, of which the so-called processionary caterpillar of Europe is an example, and observed, according to Moufet,[1] by Dioscorides and other early writers, is caused by the secretion from a minute gland at the base of each hair. The secretion of these glands fills the hollow central portion of the hair, and when the sharp, often barbed, hairs are broken in the flesh of attacking animals, the broken parts carry with them the poisonous secretion. This secretion is, perhaps, formic acid or a formate in solution. Karsten,[2] in 1848, described the anatomy of the poison glands at the base of the hairs of an American species of *Saturnia*. Fine illustrations of this kind of gland are to be found in the stinging hairs of the larvae of *Hyperchiria io* and *Hemileuca maia*, both common insects in parts of the United States. Lintner[3] and Riley[4] have recorded their experiments on the stinging power of these two species of larvae, and the latter writer has given a list of the larvae of American species of lepidoptera which are known to sting. Lintner has experimented further upon the stinging power of the larvae of *Lagoa crispata*, and Miss Murtfeldt[5] upon that of the larva of *Lagoa opercularis*. That the sting of some of these larvae can do lasting injury is certain, for my mother, when twenty-seven years old, received so severe a sting in the middle finger of one hand in brushing away a larva from her neck that the distal joint, healing only after several months, remains somewhat stiffened and slightly deformed, now thirty-seven years. For a time the stinging of these bombycid larvae was attributed to the action of the hairs in entering and wandering about in the flesh, and, even as late as 1881, long after the discovery of the glands at the base of the hairs, Goossens[6] advances the idea that the poison of the processionary caterpillar of Europe comes from other glands which I shall mention more in detail later. Keller,[7] in 1883, discusses the mode of urtication in the processionary caterpillars (larvae of *Gastropacha*) and figures the glands at the bases of their hairs.

Still another form of gland without any outlet until broken open, but a gland which can scarcely be classed with those previously mentioned, is that at the anterior end of certain bombycid pupae, which breaks when the imago springs the chitinous pupal skin, and leaves its secretion, which has been termed bombycic acid, on the head of the moth, the latter using the secretion to moisten the threads of the cocoon so that they can be cut or pushed aside to allow the escape of the imago within. I have never studied this gland and will refer for further notice to the easily accessible papers of Trouvelot,[8] Packard,[9] McLaren[10] and Worthington,[11] wherein references can be found to earlier European writers on this subject.

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[1] For literature referred to throughout this paper see the end of the article.

It is an easy transition from the glands of the larvae of *Attacus*, *Hyperchiria* and *Hemileuca*, closed by brittle, hollow spines or hairs, to the glandular hairs of certain larvae of *pterophoridae*, where the hairs are apparently burst open at their tips by the pressure of the secretion within them, the liquid then oozing out to form a dew-like drop upon each hair. Zeller[12] mentions glandular hairs ("drüsenhärchen") on the larvae of *Mimeseoptilus phaeodactylus* and *M. mictodactylus*, but says nothing of the structure or use of these hairs. Miss Murtfeldt[13] writes of the larva of *Leioptilus sericidactylus* "Dorsal hairs proceeding from prominent tubercles, and of two sizes in each tuft, each of the shorter ones tipped with a minute pellucid bead of viscid fluid, to which pollen and bits of leaves often adhere." I have found the larva of *Aciptilus lobidactylus* to be covered, in like manner, with glandular hairs.

Upon making transverse sections of the larva of *Aciptilus lobidactylus*, its external surface is found to bear three kinds of appendages. First are the very minute, but obtuse spines (about 0.01 mm. long) which clothe most softer and more flexible portions of its external covering, and which are found on many larvae of different orders of insects. Second are hairs (from 0.08 to 0.14 mm. long) more or less dumb-bell or club formed, which are filled with granular matter, and seem to be set usually only upon the surface of the chitinous covering of the larva. Third are the longer hairs (from 0.8 to 1.3 mm. long), linear or slightly clavate, usually burst at the tip, or sometimes along the sides, and where burst surrounded by a drop of exuded gummy matter. These last hairs are mounted, by a kind of joint such as is often present at the base of insect hairs, upon or near the summit of little conical elevations, which rise about 0.2 mm. above the surface of the dorsal and lateral parts of the larvae. These hairs are arranged systematically and symmetrically upon the different segments of the larva, the most prominent of them being a pair upon a conical elevation just at each side of the median dorsal line of each segment. A comparison of the arrangement of these hairs and prominences with the arrangement of hairs and warts upon other lepidopterous larvae, especially of those upon the larvae of *tortricidae*, would be an interesting study. The interior of hairs of this third form opens at the base into the conical prominence or wart on which the hair is situated. The prominence is probably entirely filled by the gland which secretes the viscid matter that finds outlet through the hair.

The specimens of the larva of which I made microtomic sections were not quite well enough preserved to admit of carefully studying the gland at the base of the hairs. The hairs of the second and third form seem to be modifications of each other, for, in the longer and more clavate hairs of the second form, the granular matter in the hair extended without interruption into the larva, and these hairs often burst and give out viscid fluid. The larger hairs of the second form are often upon the sides of the conical warts which bear at their summits hairs of the third form. Hairs of similar nature, but smaller and without viscid fluid, clothe the larva of *Oxyptilus periscelidactylus* and *Pterophorus monodactylus.*

Mimeseoptilus phaeodactylus feeds on *Ononis repens*, *M. mictodactylus* on *Saxifraga granulata*, *Lioptilus sericidactylus* on *Vernonia noveboracensis* and *Aciptilus lobidactylus* on *Solidago ?canadensis;* thus, as will be noticed, all the species of *pterophoridae* mentioned above feed on plants clothed with glandular or long hairs.* The glandular hairs of the larva protect it, probably, by causing it to resemble the surface of the plants on which it feeds, a kind of resemblance not rare in insects; but it is also probable that the secretion of the glandular hairs also protects the larva, to some extent, from the attacks of ichneumons and of other parasites, for I obtained no parasites from over fifty specimens of *Aciptilus lobidactylus*, reared from larvae taken when nearly full-grown, while I have always obtained, in rearing a much less number of *Oxyptilus periscelidactylus* under similar conditions, several parasites. It is noticeable that the viscid secretion upon the larvae of *Aciptilus lobidactylus* is alkaline to litmus paper, while the fluid from the tubercles of the larvae of *Attacus cecropia* is acid.

Turning from the study of insect-hairs which furnish more or less temporary efferent ducts for glands, there are forms of hairs—leaving out of account, as unproved, Weismann's curious, but not improbable, view[14] that scales of lepidoptera may be sometimes ducts for an odorous fluid secreted by cells at their bases—which are regularly and permanently the outlets for glands at their bases. An interesting example of this kind of open hair duct is furnished by the hairs upon the foot of the common house-fly (*Musca domestica*), through which hairs, as recently shown by Dewitz,[15] a sticky secretion is poured, the fly being enabled by the adhesion of this secretion to rest upon smooth vertical surfaces. Leydig,[16] in 1859, describes and figures glands in the tarsi of several coleoptera; West,[17] in 1862, describes and figures the tarsal hairs of the fly and of many other insects; and Dewitz,[18] in 1882, discusses the function in locomotion of the viscid secretion which is discharged by the glands of the foot through the tarsal hairs, both in flies and in coleoptera.

Defensive glands of another kind, the ducts of which open into spines, are the

---

*Miss Murtfeldt writes me as follows: "I had not thought to mention it in connection with my description of *Leioptilus sericidactylus* but there *is* a very close imitation in the dermal clothing of the larva to that of the young leaves of *Vernonia*, on which the spring and early summer broods feed." . . . "Later in the season, when feeding chiefly on the flowers, the larva acquires a purplish tinge which, with the particles of the flowers that adhere to its glandular hairs, is a sufficient disguise from any but the eye practised in its detection."

glands which furnish the poisonous secretion for the sting of bees and wasps. I have not discussed these glands further in this paper, because they are rather internal than external glands; for like reasons I have not referred to the silk-glands of lepidopterous and hymenopterous larvae. The literature of importance upon the subject of the silk-glands of lepidoptera can be found in a dissertation by Helm,[19] in 1876; and papers by Dewitz, [20-21], in 1875 and 1877, and by Forel,[22] in 1878, give a clue by which to trace the literature upon the stinging organs of hymenoptera.

The glands of the larva of *Attacus cecropia* and *Hyperchiria io*, sealed until broken open by some external agency, may be termed passive glands, while those glands which pour out their secretion in direct response to some voluntary or reflex action of the insects, as do the foot-glands of *Musca*, the sting of the bees and many other glands, may be termed active glands. But there are glands characterized by still greater activity than those already mentioned. If the larvae of certain species of *Cimbex* are suddenly disturbed, they will jet out, as observed by Bonnet[23] (v. 1, p. 470, 473, 485), a clear yellow fluid, of disagreeable odor, from openings along their sides. In the case of a German species of *Cimbex* I have seen this fluid thrown by the larva to a distance of several centimetres, altho Frisch,[24] who first mentions this secretion, in 1736, apparently only saw it flow from the openings.

Upon disturbance, the larva of the European bombycid, *Harpyia vinula*, raises its head and jerks it from side to side, throwing a strongly acid fluid from a gland, the opening of which is on the ventral side of the first thoracic segment. The propulsion is here partly produced by the rapid jerking of the head, and partly by pressure upon the receptaculum or lumen of the gland within the body. This gland, or at least its secretion, was noticed by de Geer[25] in 1750, and more fully in 1755 by Bonnet,[26] who described the secretion as a true acid, sharp, sour, and biting. Later, besides many brief notes on this gland, may be mentioned more extended descriptions by Müller,[27] Amoreux,[28] Jördens,[29] and Rengger.[30] I have not observed whether the larvae of the common American species of *Harpyia* (*Cerura*) possess this power of throwing a defensive fluid or not, and Lintner,[31] as well as French,[32] in descriptions of the American larvae, make no mention of such power. The soft skin of the larva of *Harpyia vinula* evaginates itself about the orifice, on the first thoracic segment, where the gland discharges its fluid, forming four points which are well figured by Müller and Jördens, in the books cited above. Within, the duct of the gland passes to the right of the displaced central nervous system, as described and figured by Mrs. Dimmock, in Psyche, v. 3, p. 340-341.

I pass by, with mention only, the openings which pour out an odorous yellow fluid from the joints of the legs of species of *coccinellidae*, *chrysomelidae* and *meloidae*, for further notice of which I refer to papers by Leydig[16] (p. 37-38) who thought the fluid to be only the blood of the insect; the glands opening between the prothorax and head and between the mesothorax and metathorax in *dytiscidae*, of which the nature of the secretion has been somewhat studied by Plateau[33]; the anal glands of *Brachinus* and other carnivorous coleoptera, the explosive mode of whose discharge in *Brachinus* has given rise to its popular English name of bombardier, for the literature of which I refer to Leydig[16] (p. 46-49), and to a late paper by Rougement[34]; the cornicles of the sixth abdominal segment of *aphidae*, which are supposed to pour out a sugary material sought by ants, but which material Witlaczil[35] writes, in a paper to which I will refer for further literature of the anatomy of *aphidae*, comes from the anus of these insects;[*] the sacs, probably glandular in function, found by Hagen[36] upon the larvae of certain neuroptera; the odoriferous glands of hemiptera mentioned by Landois[40] and others; the scent-glands which Aubé[41] mentions on the elytra and thorax of *Eumolpus pretiosus;* the wax-secreting glands found on certain insects, treated of by Claus,[42] in 1867; and the odoriferous glands of *phasmidae* described by Scudder, in Psyche, v. 1, p. 137-140:—all these glands I pass by, giving reference only to some papers which will guide further to the literature of the subject, in order to come directly to forms of which the morphology is more interesting in this connection, or of which the function is not so well understood.

An interesting economical provision is evident in the odoriferous tubercles of the larvae of *Attacus cecropia* and in the urticating spines of *Hyperchiria io.* There is no waste of the secreted material by either of these larvae; it is sealed up until its use is necessary and then it is applied exactly where it will accomplish most. But what shall one say of the novel mode of avoiding waste, to which attention was called by Claus,[43] in the larva of the European chrysomelid, *Lina populi?* Along the dorsal side of this larva are rows of short black spines, not noticeably different from the spines often found on larvae of coleoptera, but if the larva is disturbed it will suddenly press out upon the tip of each of the spines a spherical drop of milky liquid. Watch these drops for a moment. As the disturbance which has caused their appearance subsides, they become smaller, sometimes suddenly, sometimes gradually, but always in unison, until finally, when the larva no longer feels itself in danger, the drops entirely disappear: the fluid has been drawn back into the spines to be used again in case of need. Claus has suspected that salicylic acid exists in the secretion from the larva of *Lina populi*, which is very probable, since the larva feeds upon leaves of *Salix* and *Populus*, that contain salicin, of which salicylic acid is an oxidation-product. Claus says that the larva of *Lina populi* has been used as a source of salicylic acid in small quantities. The odorous secretion of the glands of the larva of *Lina* protect not only the larva, but, as Lyonet noticed, also the pupa, from the attacks of birds. Claus shows how this protection of the pupa is accomplished: the glands, with their contents, are shed with the last larval skin, which remains around the point of attachment of the abdomen of the pupa, and, when the latter wriggles about on account of any disturbance, the odorous fluid is squeezed from the molted glands. De Geer[45] describes and figures the spines of the larva of *Lina populi* in 1775. Lyonet,[44] probably somewhat earlier, describes and figures the larvae of *Lina populi* and *L. dorsalis*, and mentions the protrusion and retraction of the milky drops. Ratzeburg[46] mentions briefly the glandular secretion of *L. populi*, and Westwood[47] collects together notes on the larvae of different species of *Lina*. Chapuis and Candèze[48] write that the larva of *Lina* (*Plagiodera*) *scripta* from the United States is similar to that of *L. populi*.

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[*] Buckton,[37] in vol. 1, of his Monograph of British aphides, discusses (p. 39-47) "honey dew" of *aphidae* as well as (p. 37-38) various waxy and silky secretions with which hemiptera cover themselves. I may add here that Gentry's[38] observation, in 1874, that young *aphidae* suck the secretion of the cornicles of older ones is anticipated by Morren,[39] in 1836, and Morren adds to his statement "fait observé déjà par Bonnet"—fact already observed by Bonnet.

Claus[43] was the first to study the internal anatomy of the glands and spines of *Lina populi*, and he shows that the liquid is pushed out of the spines by a contraction, which I may be allowed to term an incipient evagination, of the walls of the gland. This leads one to search further in order to find if this principle of evagination of glandular walls is not carried to a greater extent in other insects. Little search reveals numerous forms of glands in which a part or the whole of the duct, or the glandular surface itself is evaginable. This form of gland is not confined to any one order of insects; altho first found in lepidopterous larvae, glands of this form have since been found in imagos of lepidoptera, coleoptera and orthoptera. The latest writer who has dealt especially with this kind of glands is Klemensiewicz,[49] in 1883.

In this group of glands or gland-like organs may be classed the evaginable osmateria of the larvae of *Papilio*, the protrusile tails or modified anal legs of the larva of *Harpyia* (*Cerura*), the lateral appendages of *Malachius*, certain evaginable appendages upon the eleventh and twelfth segments of the larvae of some species of *Lycaena*, lateral evaginable appendages in a species of *Corydia*, the red protrusile warts upon the dorsum of the larva of *Orgyia*, the evaginable warts of some of the stinging larvae of *bombycidae*, the evaginable appendages of various forms near the anus of certain imagos of lepidoptera and coleoptera, the organs on the ventral side of the first thoracic segment of many lepidopterous and of a few phryganeid larvae, and the protrusile organs near the anus of larvae of *Myrmeleon*.

Organs of the sort now under consideration were first mentioned in 1602 by Aldrovandus,[50] who observed and roughly figured osmateria on the larva of *Papilio*. Frisch[24] (Theil 2, p. 41-42), in 1721, describes the osmateria of the larva of *Papilio machaon*, which he says "protect it from its enemies, not by their strength, for they are hollow and delicate lobules, but by the stench which comes from them. Madame Merian calls it a pleasant odor (2d ed., pt. 1, n. 38) but I find it intolerable." Since the time of Frisch many authors have described the osmateria of different species of *Papilio*, among them Karsten,[2] who described, in considerable detail, the anatomy of these organs in *Papilio asterias*. He says they discharge "a substance, strong-smelling like butyric acid, by which they scare away their enemies ; this substance reddens litmus readily, produces white clouds when brought near strong ammonia, has a somewhat biting acid but not unpleasant taste. Mixed with water, oil-like drops are seen under the microscope ; neutralized with ammonia it crystallizes." The crystals "are not volatile upon raising the temperature but decompose with disengagement of empyreumatically smelling vapors. Caustic baryta dissolves the acid, the salt crystallizes in groups of very fine needles." For the anatomy and histology of the osmateria of the larvae of *Papilio* I will refer to Karsten[2] and Klemensiewicz.[49]

Each of the two caudal appendages of the larva of *Harpyia* consists of a basal tube which projects backward from the posterior end of the larva, but which can be turned somewhat upward and forward. Out of the tip of each of these basal tubes a reddish filament can be evaginated, which the larva, upon the approach of danger, curves above the body and waves with a trembling motion seeming often to whip the whole surface of its body. These threads or filaments are probably evaginated by internal pressure of the fluids of the body, but are retracted by muscles within them. There is some doubt whether these threads are really glands, and Frisch[24] (1740, Theil 6, p. 18-19), who expected to find them odorous, writes that the odor "must be very subtile and be only perceptible, for the most part, to insects hostile to this larva" ; but, if these filaments are not glands, they have the same coarser anatomy and should be considered here.

The earliest description of the evaginable caudal appendages of *Harpyia* that I have seen is that by Goedart,[51] who says of them "This larva has two tails and when it is vexed, it will throw out from both tails a red rod or sting, which it bends back, and, as if mad, vibrates formidably, and draws it back in again." Since Goedart's time these appendages have been described by Réaumur,[52] Frisch[24] (Theil 6, p. 18-19), de Geer[45] (Bd. 1, tab. 23, fig. 12), Bonnet,[26] Müller[27] (p. 28-30), Jördens,[29] Meckel,[53] Klemensiewicz,[49] and others. Some of these authors also describe the gland previously mentioned (p. 391), as opening upon the under side of the first thoracic segment of the same larva, and Schäffer,[54] in 1754, first shows the intimate relationship of this gland to evaginable glands found in the same position on larvae of other species, to the osmateria of the larvae of *Papilio*, and in general mode of action to the evaginable glands of *Malachius*.

The evaginable organs of the imago of

Malachius consist of a pair of reddish, trilobed organs, one on each side, between the head and the first thoracic segment, and a similar, but somewhat larger pair of bilobed organs, one on each side, between the metathorax and first abdominal segment. These organs are protruded by the fluids of the body-cavity, but have muscles for their retraction. These organs were mentioned by Schäffer[54] in 1754, by Sulzer[55] in 1761, and since that time more or less discussed by Kirby and Spence[56] (in whose work may be found much that is important and interesting on the glands and odors of insects), by Westwood,[47] Laboulbène,[57] Liegel,[58] Klemensiewicz,[49] and by others whose papers I cannot at present cite, as I have not collected the literature of this part of my subject with much thoroughness. The function of these organs of *Malachius* is not determined with certainty.

The larvae of certain species of *Lycaena* have been found to attract ants, on account of an opening upon the dorsum of the eleventh segment, which gives out a liquid apparently containing sugar. Upon the twelfth segment, and evidently connected in function with the opening above mentioned, are two protrusile organs covered with fine hairs. The fact of ants being attracted to these larvae was first observed, so far as I can learn, by Esper; Petzhold,[59] in 1793, figured, and described with considerable minuteness; the appearance of the protrusile organs on the twelfth segment of *Lycaena biton*, and mentions their occurrence on the larvae of other species. Guenée,[60] in 1867, describes and figures these organs in *Lycaena boetica*. W. H. Edwards,[61-62] in 1878, described and figured similar organs on *Lycaena pseudargiolus* and *L. comyntas*, American species. Scudder,[63] in 1881, repeats Edwards' figures, referring however to Guenée as the discoverer of these organs. The function and structure of the evaginable organs of the larva of *Lycaena* are not yet settled.

Evaginable organs were described from a blattid, *Corydia carunculigera*, by Gerstaecker,[64] in 1861. The organs of *Corydia* are yellowish white, covered with hairs, and there are two of them on each side of the insect, evaginable from between the dorsal and ventral plates of the first and second abdominal segments. These organs are present in both male and female, but are not found in the larva of *Corydia*. Gerstaecker suspected them to be of glandular nature. Brunner von Wattenwyl,[65] in 1879, described an evaginable organ on the femora of *acrididae*; Burgess gives an abstract of his paper in PSYCHE, v. 3, p. 32. These organs in *acrididae* and those of *Corydia* are the only evaginable organs of which I have found mention in orthoptera.

The larvae of European species of *Orgyia* (*e.g.*, of *O. auriflua*) have long been known to have evaginable warts upon their dorsum. Brief notice of these warts will be found in works of Schwarz,[66] Jördens,[29] Klemensiewicz,[49] and other writers, but I have found only the slightest allusions to them in American species. Fitch[67] in describing the larva of *O. nova*, mentions them; Coleman,[68] in describing the larva of *O. leucostigma*, terms them "coral-red retractile warts"; and Coquillett,[69] in describing the larva of *Parorgyia clintonii*, speaks of them as "reddish warts" without adding that they are retractile.

Evaginable warts similar to those upon the dorsum of *Orgyia* are present on different parts of various bombycid larvae, and Klemensiewicz[49] has described their structure in *Leucoma salicis*. I have mentioned their occurrence in *Hyperchiria io* on p. 352-353 of Psyche, v. 3, and they seem especially abundant on stinging larvae. Goossens[6] regards the spines of the larvae of *Cnethocampa* to be poisonous because of a powder produced by the drying of the secretion given out by the evaginable glands upon the dorsum of these larvae. This view seems inacceptible after Karsten,[2] Keller[7] and others have so clearly proved the presence of glands at the bases of the spines of these stinging larvae.

The structure of the evaginable warts and their glands in *Leucoma salicis* is well described by Klemensiewicz,[49] and will answer in a general way for the similar warts of *Orgyia* and of the European *Liparis*. The wart is protruded by pressure of the fluids within the body and retracted by muscles; at or near its centre open the ducts of one or two glands which are situated beneath the warts. The position and general structure of these glands, as well as their motion when the larvae are disturbed, indicate that they are defensive in function, but exact observations are still lacking on this subject.

In quite a number of *staphylinidae*, and more rarely in other beetles, there is a pair of evaginable organs, one on each side of the anal opening, which give off a disagreable odor when protruded, and which must have attracted the attention of most collectors of coleoptera in capturing the larger species of *staphylinidae*. They have been mentioned or described by Schäffer,[54] Dufour,[70] and Leydig[15] (p. 52-53). The function of these organs is evidently defensive.

Similar appendages, but often more striking on account of their greater size, have been found in several lepidoptera, in most cases American species, altho the first mention of these organs in lepidoptera also dates back to Schäffer,[54] in 1754. I have given an outline of the bibliography of this subject, as far as it concerns the species of lepidoptera found in this vicinity, in Psyche, v. 4, p. 59, and need not repeat it here. Fritz Müller,[71-74] has contributed several papers (in 1874, 1877, and 1883) to this subject. Doubleday[75] (1846-1850) called attention to the presence of such organs in butterflies of the genus *Acraea*.

These organs are sometimes naked and sometimes clothed with hairs or scales. The long yellow organs protruded by *Spilosoma acrea* are good examples of the hair-clothed form, while the organs described by Fritz Müller in *Heliconius* and allied genera are covered with scales. The function of all these organs is not yet determined, but it is certain that a part of them at least are for the distribution of odor.

Mention has been made already twice of the gland which opens beneath the first segment of the larva of *Harpyia vinula*. In the same position on many larvae, some of those of *Vanessa*, *Melitaea*, *Argynnis*, *Bryophila*, *Cucullia*, *Habrostola*, and *Cleophane*, according to Rogenhofer[76]; and of *Aporia*, many satyrids, *Aplecta* and *Leucania*, according to Goossens[77]—is an evaginable portion, which, in some cases, probably in all, is glandular, but the function of which is entirely undetermined except in the case of *Harpyia vinula*, where it is an organ of defense. These organs were compared to the osmateria of *Papilio* larvae by Schäffer,[54] and have been more or less discussed by Rogenhofer,[76] Lacordaire,[78] Goossens[77,79] and Klemensiewicz.[49] Bonnet[80] discovered these organs in 1739, altho he published nothing about them, as far as I know, until 1755, a year after the paper mentioned above was published by Schäffer. Bonnet gives a list of thirty-one caterpillars which possess these organs, and he tried experiments to see if cutting off these organs in larvae affected in any way the imago produced from them, proving that imagos from larvae thus treated were perfect. Bonnet[23] (p. 503-504) also found two evaginable fleshy organs near the posterior extremity of the abdomen in the larva of the ant-lion (*Myrmeleon*).

Réaumur[52] (1737, tome 3, p. 165), notices an organ, probably similar to that under the first thoracic segment of certain lepidopterous larvae, in the same locality, on a phryganeid larva, and Rogenhofer,[76] mentions, on the authority of Brauer, a protrusile organ beneath the first segment of a phryganeid larva.

In dealing with the protrusile organs of different insects above, I have given more citations of early authors than I should have done had I found them brought together elsewhere. Klemensiewicz, altho not claiming to give the full literature of the subject, certainly omits, and apparently has not seen, some of the more important papers on the subject of which he treats. I have mentioned only the more important papers on the glands of European insects, but I have sought to refer to all papers which have dealt originally with evaginable glands of American insects.

I have not examined carefully the papers published upon the subject of femoral tufts of lepidoptera, or tufts upon other parts of lepidopterous insects, which tufts I presume may well come into consideration at this point. Fritz Müller[81] treated of them at some length in 1877. They have been suspected often to be organs for the distribution of odors, and Bertkau[82] has shown, in one case — that of the male of *Hepialus hecta* — that the analogous tibial organ is filled with glands, and is used, in connection with organs on the first abdominal segment, to diffuse an odor for sexual purposes. These organs of *Hepialus* are noticed more fully than here, by Burgess, in PSYCHE, v. 3, p. 32.

A few considerations upon the use to which the different forms of glands, so briefly noticed in this paper, especially adapt themselves may be appropriate in closing this paper. The simple glandular opening is not economical for the application of odorous, ill-tasting or irritating fluids. If it is provided with means for throwing its secretion, as it is in *Cimbex* and *Harpyia*, it is somewhat more efficient at long range. The chances, however, of a waste of the secreted matter are still great, and, as Jördens has observed, the larva of *Harpyia* uses its stream-throwing gland only when much disturbed. For the application of an ill-tasting fluid the modified form of gland found in the knobs of the larva of *Attacus cecropia* seems to be the best. The secretion is set free by the very action of the enemy of the larva. The use of a strongly irritating fluid attains its highest development in means of injecting the fluid into the flesh of the attacking animal, as is done by *Hyperchiria* and by many hymenoptera. The greatest economy in the use of an odorous fluid is attained by exposing suddenly a large surface moistened with the fluid to the surrounding air. This is accomplished by osmateria, as in the larvae of *Papilio*, and by various evaginable appendages, in other insects. Clothed with hair these appendages expose still more surface to the air, and thus give still better results in rendering the surrounding air odorous, whether for protective or for sexual purposes. For sexual purposes a less penetrating, often to us a less disagreeable, odor, and less of it, is necessary than for protective purposes. It is perhaps for this reason that the evaginable appendages of *Spilosoma*, and of some other lepidoptera, appear to us always dry. The reason for the invagination of odor-distributing appendages is a double one; first when invaginated their necessarily delicate surface is less liable to injury, and, second, their surface can be kept constantly moistened and ready for use without loss of the odorous fluid. Besides this, too, is the general rule that the appendages of locomotory animals are, as far as is possible in attaining the purpose for which they are developed, normally invaginated or retracted to avoid hindrance to locomotion, while the corresponding organs of sessile animals and plants attain their surface-development by evagination.

Secretions which are intended to protect by their odor usually protect by their taste also, for taste and smell are so nearly related senses in higher animals, while such glands as secrete ill-tasting fluids, if these fluids are volatile, also usually protect by their odor. Still it may be safely asserted, *as a general rule*, that odor protection is accomplished by evaginable organs.

The chemical substances proved by actual test to be secreted by external glands of insects are few in number, and, as I hope sometime to make this the subject of a special paper, I should be glad to have my attention called to any secretions of insects, especially to such as can be obtained in sufficient quantity for chemical examination.

In the preceding notes I have sought to call attention to glands of insects, in hope that some American students of insects, who have not enlisted already in that army of species-describers, which represents so-called *American* entomology by a probable majority, may be induced to turn their attention to the anatomy, biology or physiology of American insects. The study of the general anatomy of insects can be pursued in any country, but there always remain special points in the anatomy of insects, of which points glands and similar modifications of parts of insects for special purposes form no small part, wherein insects of one country differ from those of any other. In such fields of study as these young American entomologists can compete most successfully with European anatomists and can make important discoveries, and to researches of this kind future entomologists who have aspirations to become more than locally known must turn their attention. Leave the creation of scientific names, quarrelling over synonyms among them, and search for new species, to the antiquated type of naturalists who have become so habituated to studying the exterior of their insects that to "destroy" a rare specimen by dissecting it has become a crime to them. In their regard for the exterior of animals, coupled with their crude knowledge of internal anatomy, they remind me of Romans, who makes a grave statement in his history of Florida (p. 55), that "Anatomy has taught us, that the bone of a negroe's skull, is always black."

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PSYCHE.

CAMBRIDGE, MASS., SEPT.-OCT., 1882.

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CAMBRIDGE ENTOMOLOGICAL CLUB.

(*Continued from p. 369.*)

14 APRIL 1882.—84th meeting. Mr. S: H. Scudder read a letter from Prof. J: H: Comstock on his recent researches in entomology.

Mr. R. Hayward made a few remarks on the food of several New England birds. He stated that his remarks were only preliminary, since he lacked sufficient material to render his work conclusive. Dr. H. A. Hagen expressed his surprise that no hemiptera had been discovered in the stomachs of the cliff-swallow (*Petrochelidon lunifrons*) of which three specimens had been examined, as he had taken young nestlings of the European swallow literally filled with aphides.

Dr. Hagen showed, from an as yet unpublished monograph, some plates of *psocina* and *atropina*. He stated that all the fossil species of *Psocus* and *Epipsocus* are similar in all respects to the modern species of those genera, while on the other hand, there is considerable difference between the modern and fossil species of *atropina*. All the species of *Atropos* are furnished with the organs necessary for producing sound, but the sound, if produced, is probably not audible to our ears; in the other genera these organs are entirely wanting.

Mr. S: H. Scudder exhibited a specimen of a fossil insect probably belonging to the *thysanura*. There is apparently no head but this part is reduced to mouth-parts which are distinct, and evidently concealed, when at rest, within the second thoracic segment, and can be thrust beyond the body. This peculiarity is not individual, as a number of specimens examined by Mr. Scudder possess the same characteristic. He then showed drawings representing the insect restored.

NOTES ON PTEROPHORIDAE OF NORTH AMERICA.

The following references were collected, for the most part, in endeavoring to find out if the glandular hairs of some of the larvae of *pterophoridae* had been studied. The notes here given cite the original and the prominent subsequent descriptions of larvae of *pterophoridae* of North America[1] that have been reared. To these citations are added references to published figures of different stages, to notices of food-plants of larvae, to localities of capture, and to observations on a few species that I have taken or reared.

For the identification of the *pterophoridae* of my collection I am indebted to Prof. C. H. Fernald, of Orono, Maine.

Chrysocorys festaliella Hübn. (Wocke, Cat. 2705). Imago figured by Walsingham (Pteroph. Cal. and Oreg., 1880, p. 1-2, pl. 1, fig. 1), by whom it is said "They appear to be in all respects the same as European specimens, having also the same habit of frequenting one or more species of the genus *Rubus*." Found in Cal. and in Europe.

Chrysocorys felicella Wlsm. (Pteroph. Cal. and Oreg., 1880, p. 2-3). Walsingham reared this species from larvae feeding on two kinds of *Orthocarpus* (*l. c.*, p. 3), and figures its pupa and imago (*l. c.*, pl. 1, fig. 2). Oregon.

Chrysocorys erythraeella Clemens (Proc. Acad. nat. sci. Phil., 1860, p. 171). Clemens (*l. c.*) describes the larva and pupa, and writes "The larva feeds on the fruit racemes of sumach [*Rhus*]" in July. Pa.?

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[1] The notes are each independent and can be cut and pasted on slips by those persons who thus use the Bibliographical record.

Platyptilus bertrami Rössl. (Wocke, Cat. 3122). Thought by Walsingham to be the same as *P. ochrodactylus* Hübn. (Zeller, in Isis, 1841, p. 775, tab. 4, fig. 16-19) and *P. bischoffii* Zell. (Entom. zeit. . . . zu Stettin, 1867, p. 333). Figured by Walsingham (Pteroph. Cal. and Oreg., pl. 1, fig. 3). Fish writes (Can. entom., Nov. 1880, v. 12, p. 240), "I am strongly of the opinion that the larvae feed in the stalks of our common yarrow (*Achillea millefolium*), since the moths are often taken about this plant, and since the European species feeds in the stalks of *Achillea ptarmica* and *Tanacetum vulgare*. The moth appears in New England in June." A specimen taken 14 July 1874, on Mt. Washington, N. H., was determined for me by Prof. Fernald (July 1883) as "*Platyptilia bischofii* Zell." New England, Cal., Oreg., Europe.

Platyptilus carduidactylus Riley (1st Rept. state entom. Missouri, 1869, p. 180-181, pl. 2, fig. 13-14). Riley (*l. c.*) describes the larva, and describes and figures the pupa and imago of this species, giving *Cirsium lanceolatum* as food-plant of the larva. The imago is figured by Walsingham (Pteroph. Cal. and Oreg., 1880, pl. 1, fig. 6). Atlantic Coast, Mo., Cal.

Platyptilus orthocarpi Wlsm. (Pteroph. Cal. and Oreg., 1880, p. 11-12, pl. 1, fig. 9). The imago is figured by Walsingham (*l. c.*), who writes "the larvae were found feeding on buds and flowers of a species of *Orthocarpus*." Oreg.

Platyptilus shastae Wlsm. (Pteroph. Cal. and Oreg., 1880, p. 14-16, pl. 1, fig. 11). Found by Walsingham flying among plants of *Arnica angustifolia*. Cal.

Amblyptilus cosmodactylus Hübn. Walsingham (Pteroph. Cal. and Oreg., 1880, p. 24) quotes Zeller as regarding this species identical with *A. ulodactylus* Zett. and *A. acanthodactylus* Hübn., and (*l. c.*, p. viii) says Zeller has bred the first and last form from larvae feeding upon *Aquilegia* and *Geranium pratense*. Jordan (Entom. mo. mag., Oct. 1881, v. 18, p. 117) gives *Ononis*, *Pelargonium* and *Stachys* as food-plants of *A. acanthodactylus* which he says is quite distinct from *A. cosmodactylus* in England. New England, Cal., Oreg.

Oxyptilus periscelidactylus Fitch (1st and 2nd Rept. nox. ins. N. Y., 1856, p. 139-143). Fitch describes (*l. c.*) the larva, pupa, and imago of this insect, and gives the grapevine, *Vitis*, as its food-plant. The pupa and imago are figured by Riley (1st Rept. state entom. Missouri, 1869, pl. 2, fig. 15-16), and the larva, pupa and imago are described and figured by Riley (3rd Rept. state entom. Missouri, 1871, p. 65-68); the latter figures are reproduced in Amer. entom., June 1870, v. 2, p. 234, and in Can. entom., May 1873, v. 5, p. 99. The imago is figured by Walsingham (Pteroph. Cal. and Oreg., pl. 2, fig. 5). New England, N. Y., Mo., Tex.

Oxyptilus nigrociliatus Zell. (Verh. zool.-bot. gesells. Wien, 1873, bd. 23, p. 322-323). I have taken 2 specimens in Amherst, Mass. Previously published localities: Cal., N. Y., Del.

Oedematophorus grisescens Wlsm. (Pteroph. Cal. and Oreg., 1880, p. 34-35). Described (*l. c.*) from "Eight specimens bred from larvae feeding on a species of *Artemisia* early in May 1872, on Rouge River, Southern Oregon." Imago figured (*l. c.*, pl. 2, fig. 11).

Oedematophorus occidentalis Wlsm. (Pteroph. Cal. and Oreg., 1880, p. 37-39). One specimen was bred by Walsingham from a larva "reared on leaves of a species of sunflower [*Helianthus*]." Imago figured (*l. c.*, pl. 2, fig. 13-14).

Oedematophorus inquinatus Zeller (Verh. zool.-bot. gesells. Wien, 1873, bd. 23, p. 325). Miss Murtfeldt (Amer. entom., Oct. 1880, v. 3, p. 236) states that the larva feeds upon *Ambrosia artemisiaefolia*. Coquillett (Papilio, April 1882, v. 2, p. 61-62) describes the larva and chrysalis of this species. Mo., Tex., ?N. Y.

Oedematophorus ambrosiae Murt. (Amer. entom., Oct. 1880, v. 3, p. 236). Miss Murtfeldt (*l. c.*) describes the larva, pupa and imago of this species; its larva feeds on *Ambrosia artemisiaefolia*. Mo.

Pterophorus monodactylus Linn. (Wocke, Cat. 3167). Synonyms are *P. cineridactylus* Fitch (1st and 2nd Rept. nox. ins. N. Y., 1856, p. 144) and *P. pergracilidactylus* Pack. (Ann. Lyceum nat. hist. N. Y., 1873, v. 10, p. 265-266). Two varieties of the imago are figured by Walsingham (Pteroph. Cal. and Oreg., 1880, pl. 2, fig. 16, and pl. 3, fig. 1). I have reared numerous specimens of this species from larvae feeding upon *Convolvulus tricolor* and *Ipomoea purpurea*, in Cambridge, Mass. Some years the larvae are so numerous, from late in June until October, as to nearly destroy beds of *C. tricolor* and to seriously damage the appearance of plants of *I. purpurea*. The larva usually eats into the leaf and flower buds of *C. tricolor;* on *I. purpurea* it begins eating the tips of the advancing stems, but the growth of the plant is so rapid that the larva is soon left below, among leaves which have become larger. The larva then, in most cases, eats half-way through the petiole of a large leaf; the leaf soon wilts and the larva finds shelter beneath the wilted portion. A similar habit of eating the stem half through to make parts of a plant wilt, and thus to furnish a protecting shelter, is mentioned by Greening (Entom. mo. mag., July 1867, v. 4, p. 39-40) in the case of the larvae of the English species *Oxyptilus hieracii*, which feed upon *Teucrium scorodonia*. *P. monodactylus* has been recorded from Mass., N. Y., Ill., Cal., Oreg., and Europe.

Lioptilus homodactylus Walk. (Cat. lep. het., pt. 30, p. 941). According to Walsingham this species is possibly the same as *L. hololeucos*, Zell. (Verh. zool.-bot. gesells. Wien, 1874, bd. 24, p. 445). Larva and chrysalis described by Coquillett (Papilio. April 1882, v. 2, p. 62); the larva feeding on *Solidago missouriensis*. Imago described and figured by Walsingham (Pteroph. Cal, and Oreg., 1880, p. 50-53, pl. 3, fig. 8-9). I took one specimen in Cambridge, Mass., 10 July 1879. Mass., ? N. Y., Cal., Oreg.

Lioptilus helianthi Wlsm. (Pteroph. Cal. and Oreg., 1880, p. 54-55). Figure of imago (*l. c.*, pl. 3, fig. 11), which was reared from larva found feeding on a species of *Helianthus*. Oreg.

Lioptilus sericidactylus Murtfeldt (Amer. entom., Oct. 1880, v. 3, p. 235-236). Miss Murtfeldt (*l. c.*) describes the egg, larva, pupa and imago of this species; the larva feeds on the leaves and flowers of *Vernonia noveboracensis*. I took a specimen of this species on Mt. Washington, N. H., 14 July 1874. N. H., Mo.

Lioptilus kellicottii Fish (Can. entom., July 1881, v. 13, p. 141). Fish states (*l. c.*) that this is the species of which the larva, described by Kellicott (*l. c.*, June 1880, v. 12, p. 105-106), bores in the stems of *Solidago*. Buffalo. N. Y.

Aciptilus lobidactylus Fitch (1st and 2nd Rept. ins. N. Y., 1856, p. 143-144). The larvae of this species are sometimes very abundant on *Solidago ? canadensis*, in Cambridge, Mass., during June. The larvae are clothed with green or brownish hairs which have dew-like drops of clear liquid upon them. The period of pupation, of from six to nine days, is in the latter part of June or the early part of July. Mass., N. Y.

Aciptilus montanus Wlsm. (Pteroph. Cal. and Oreg., 1880, p. 59-60). Note by Kellicott (Can. entom., June, 1880, v. 12, p. 106) upon a larva eating the foliage of *Solidago;* this larva is stated by Fish (Can. entom., July 1881, v. 13, p. 141) to be that of *A. montanus*. Imago figured by Walsingham (Pteroph. Cal. and Oreg., 1880, pl. 3, fig. 14). Cal., ? N. Y.

Alucita hexadactyla, Linn. (Wocke, Cat. 3211). Frisch (Besch. v. allerley insecten in Teutschland, 1721, th. 3, p. 19-20, tab. 7) figures and describes the larva and imago, giving the food of the larva as the buds of [*Lonicera*] *caprifolium*. Imago figured by Walsingham (Pteroph. Cal. and Oreg., 1880, pl. 3, fig. 16). Cal., Oreg.

Saunders (Ann. rept. Entom. soc. Ontario, 1873, p. 14-15) describes the larva of an undetermined species of *Pterophorus* which fed on the raspberry (*Rubus*).

G: Dimmock.

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Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

Corrections of errors and notices of omissions are solicited.

Bauer, —, *see* MARTIN, P. L. Die Praxis der Naturgeschichte . . . [Rec., 2903].

Brandt, Eduard. Beiträge zur Kenntnis des Nervensystems der Dipterenlarven. Vorläufige Mittheilung. (Zool. Anzeiger, 15 May 1882, jahrg. 5, p. 231-234.)

Anatomy of the nervous system in the larvae of certain families of diptera. *G: D.* (2892)

Brauer, Friedrich. Ueber Latreille's Segment médiaire und das Metathorax-Stigma der Dipteren. (Zool. Anzeiger, 19 June 1882, jahrg. 5, p. 306-307.)

Author's changes of opinion in regard to the structure of the thorax of diptera since the publication of his paper on that subject in the Denkschr. d. kais. Akad. d. Wissensch. Wien, Math.-nat. Cl., 1880, bd. 42, abth. 1, p. 8-9, Separ. *G: D.* (2893)

Cholodkowsky, N. Zur Anatomie der *tinea pellionella.* (Zool. Anzeiger, 22 May 1882, jahrg. 5, p. 262-264.)

Testes and malpighian tubes of *tinea pellionella;* the malpighian tubes are six in number in the larva, but only two in the imago. *G: D.* (2894)

Delpino, Federico, Impollinazione e fecondazione nel cotone e in altre specie. (Revista botanica, 1880, p. 41-42.)

Abstract of W: Trelease's "Nectar, its nature, occurrence, and uses . . . " [Rec. 2475], his "Fertilization of several species of *lobelia*" (Amer. nat., July 1879, v. 13, p. 427-432) [Rec., 1625], and his "The fertilization of our native species of *clitoria* and *centrosema*" (Amer. nat., Nov. 1879, v. 13, p. 688-692) [Rec., 1549]. *W: T.* (2895)

[**Entomological club** of the American association for the advancement of science. 7th annual meeting, Boston, Mass., Aug. 1880; Notice of.] (Springfield [Mass.] d. republican, 1880: 12 Aug., p. 6, col. 5, 1 cm.; 25 Aug., p. 6, col. 6, 16 cm.; 1 Sep., p. 5, col. 2, 45 cm.)

Abstracts of S: H. Scudder's "Problems in entomology" [Rec., 2181], of C: V. Riley's "Additional notes on the army worm . . ." and of C: V. Riley's "Some recent practical results of the cotton worm inquiry . . ." *G: D.* (2896)

Entomological club of the American association for the advancement of science, *see* AMERICAN ASSOCIATION [etc.]—*Entomological club* . . .

[The original references should have been under this heading. *B: P. M.*]

Horn, G: H: Synopsis of the *histeridae* of the United States. (Proc. Amer. philos. soc., 20 June 1873, v. 13, p. 273-360, pl. 5.)

Separate, [Phil.], 30 Sept. 1873. t.-p. cover, p. 273-360, pl. 5, 24×15, t 17×9.7.

Rev., by G: H: Horn. (6th ann. rept. trustees Peabody acad. sci. for 1873, 1874, p. 93.)

Rev., by E. C. Rye. (Zool. rec. for 1873 . . . *Van Voorst*, Lond., 1875, v. 10, p. 259.)

Figures 9 species. *S: H.*

Describes some new species and the following new genera: *tribalister, anapleus, teretriosoma* and *aeletes.* *H: W. T.* (2897)

Horn, G: H:, *see* LECONTE, J: L. and G: H: HORN. The *rhynchophora* of America north of Mexico [Rec., 2901].

Howard, Leland Ossian. Additional notes on the genus *antigaster* of Walsh. (Can. entom., Feb. 1881, v. 13, p. 31-33, fig. 3.)

Reasons why the author regards *antigaster,* Walsh, a synonym of *eupelmus,* Dalm. *G: D.* (2898)

Jäger, Gustav, *see* MARTIN, P. L. Die Praxis der Naturgeschichte . . . [Rec., 2903].

LeConte, J: Lawrence. Additional descriptions of new species of Florida coleoptera. (Proc. Amer. philos. soc., 1 Feb. 1878, v. 17, p. 373-434.)

Appendix to E. A. Schwarz' "The coleoptera of Florida" [Rec. 2904]; description of the 5 new genera *rhinoscepsis* [*pselaphidae*], *smicrips* [*nitidulidae*], *byrrhodes* [*ptinidae*], *zaplous* [*cerambycidae*], and *dignamptus* [*tenebrionidae*]; mention or description of 148 [139 new] species, the new species, belonging to the genera *dyschirius, onota, platynus,* LOXANDRUS, *selenophorus, hydroporus, dineutes,* OCHTHEBIUS, *rhinoscepsis, rhexius,* TRIMIUM, *euplectus,* ACYLOPHORUS, *quedius,* CRYPTOBIUM, PAEDERUS, PALAMINUS, *brachypeplus, smicrips, scymnus, oeneis, pentilia, saprinus, acritus, geotrupes, diplotaxis, anomala, taphrocerus, nematodes, anchastus, athous, cyphon, lucidota, photinus, ozognathus, hemiptychus,* CATORAMA, *dorcatoma,* CAENOCERA, *byrrhodes, elaphidium, leptostylus, zaplous, donacia, diabrotica, oedionychis, argopistes, sphaeroderma,* CHAETOCNEMA, *blapstinus, dignamptus, phaleria, platydema,* HYPOPHLOEUS, STRONGYLIUM, XYLOPHILUS, *dircaea, mordella, conotrachelus, acalles, cryptorhynchus, barilepton, sphenophorus, mesites, pityophthorus, cryphalus, euxenus;* synopsis of the species of the genera named above in SMALL CAPITALS; figures of the elytra of some species of *mordella.*

H: W. T.; E. A. S. (2899)

LeConte, J: Lawrence. Remarks on geographical distribution. (Proc. Amer. philos. soc., 1 Feb. 1878, v. 17, p. 470-472.)

Appendix to E. A. Schwarz's "The coleoptera of Florida" [Rec., 2904]. A few species are common to the Antilles and Florida. *H: W. T.* (2900)

LeConte, J: Lawrence *and* G: H: **Horn.** The *rhynchophora* of America north of Mexico. (Proc. Amer. philos. soc., Dec. 1876, v. 15, p. 1-16, 1-455.)

Separate, Phil., 1876. half-t.-p. cover, t.-p., 16+455 p., 24×15, t 16.3×9.7.

Rev., by E. C. Rye. (Zool. rec. for 1876 . . . *Van Voorst*, Lond., 1877, v. 13; Ins., p. 75-76, *and at intervals on each* p. 80-83, 85-104.)

Descriptions of families, sub-families, genera and species. Dr. G: H: Horn contributes the monograph of the *otiorhynchidae*, p. 13-112; and B: P. Mann the economic bibliography, p. 438-443. *S: H.*

Describes the following new genera: *minyomerus, anomadus, hormorus, agasphaerops, calyptillus, eupagoderes, dichoxenus, melamomphus, anametis, orimodema, diamimus, peritaxia, thricomigus, amnesia, nocheles, cimbocera, sciopithes, agronus, neoptochus, thricolepis, peritelopsis, geoderces, aragnomus, dysticheus, eucyllus, thinoxenus, rhypodes, chaetechus, dirotognathus, aramigus, phacepholis, achrastenus, omileus, cyphomimus, mitostylus,* [OTIORHYNCHIDAE]; *triglyphus, plinthodes, acmaegenius, trichalophus, lophalophus, hypomolyx, pachylobius, centrocleonus, cleonopsis, cleonaspis, desmoris, onychylis, anchodemus, lixellus, lissorhoptrus, pnigodes, phycocoetes, coccotorus, macrorhoptus, alyca, proctorus, encalus, plocetes, thysanocnemis, tylopterus, paragoges, notolomus, micralcinus, zaglyptus, microhyus, acamptus, eurhoptus, micromastus, phyrdenus, zascelis, baropsis, acoptus, craponius, cnemogonus, acallodes, orthoris, rhoptobaris, trichobaris, aulobaris, onychobaris, pseudobaris, ampeloglypter, pachybaris, stethobaris, microcholus, calandrinus, zygobaris, barilepton, euchaetes, plocamus, hormops* [CURCULIONIDAE]; *trichischius, cactophagus, rhodobaenus, yuccaborus, gononotus, macrancylus, allomimus* [CALANDRIDAE]; *thysanoes, chaetophloeus, hylurgops, scierus* [SCOLYTIDAE]; *gonotropis, eurymycter, allandrus, toxotropis, gonops, eusphyrus, phoenicobius, anthribulus, euxenus* [ANTHRIBIDAE]. *E. A. S.* (2901)

Macloskie, G: The endocranium and maxillary suspensorium of the bee. (Amer. nat., May 1881, v. 15, p. 353-362, fig. 1-6.)

Separate, with t.-p. cover + p. 353-362, 23.5 × 15, t 17.5 × 10.3.

Anatomy of the endocranium of the bee [*apis mellifica*], comparison of the structure of its endocranium with that of other insects. *G: D.* (2902)

Mann, B: Pickman, *see* LeConte, J: L. *and* G: H: Horn. The *rhynchophora* of America north of Mexico [Rec., 2901].

Martin, L., *jr.*, *see* Martin, P. L. Die Praxis der Naturgeschichte . . . [Rec., 2903].

Martin, Paul, *see* Martin, P. L. Die Praxis der Naturgeschichte . . . [Rec., 2903].

Martin, Philipp Leopold. Die Praxis der Naturgeschichte. Ein vollständiges Lehrbuch über das Sammeln lebender und todter Naturkörper; deren Beobachtung, Erhaltung und Pflege in freien und gefangenen Zustand; Konservation, Präparation und Aufstellungen in Sammlungen etc. . . . 2e . . . Aufl. Weimar, *B. F. Voigt*, 1880. 3 Theile, 23×15, t 17.5×10.5. With atlas, 24×33, t 18.5×24.5.

2ter Theil: Dermoplastik und Museologie, oder das Modelliren der Thiere und das Aufstellen und Erhalten von Naturaliensammlungen. Unter Mitwirkung von Gustav Jäger, [W.] Steudel und Paul Martin. Nebst einem Atlas von 10 Tafeln nach Zeichnungen von Paul Meyerheim, Friedr. Specht und L. Martin *jun.* t.-p. cover, 16+295 p. With atlas, M. 7.50.

Atlas zur Praxis . . . 2ter Theil: . . . t.-p. cover, 10 pl.

A general work on collecting and preparing specimens for museums. Besides remarks on insects in different parts of the book, p. 145-182 are devoted to the capture, rearing and preparation of insects. The above directions are by Bauer, to which are added directions for the preparation of microlepidoptera, by W. Steudel. *G: D.* (2903)

Meyerheim, Paul, *see* Martin, P. L. Die Praxis der Naturgeschichte . . . [Rec., 2903].

Schwarz, Eugene Amandus. The coleoptera of Florida. (Proc. Amer. philos. soc., 1 Feb. 1878, v. 17, p. 353-372.)

Describes 34 new species, belonging to the genera *lebia, apenes, cyclonotum, sacium, scydmaenus, languria, tomarus, lathropus, laemophloeus, nemicelus, philothermus, olibrus, brachyacantha, hyperaspis, strigoderma, taphrocerus, brachys, pachyscelus, temnopsophus, eupactus, metachroma, chrysomela, systena, epitrix, chaetocnema, microrhopala, strongylium, hymenorus, isomira, xylophilus,* and *glipa*. To this article are appended the following: LeConte, J: L. Additional descriptions of new species of Florida coleoptera [Rec., 2899] (p. 373-434); Schwarz, E. A. List of species of coleoptera found in Florida [Rec., 2905] (p. 434-469); LeConte, J: L. Remarks on geographical distribution [Rec., 2900] (p. 470-472). *H: W. T.* (2904)

Schwarz, Eugene Amandus. List of species of coleoptera found in Florida. (Proc. Amer. philos. soc., 1 Feb. 1878, v. 17, p. 434-469.)

Apparently very full list, appended to author's "The coleoptera of Florida" [Rec., 2904] with notes on habitat and abundance. *H: W. T.* (2905)

Scudder, S: Hubbard. The showiest butterfly of Glen Ellis (*basilarchia arthemis*). (Appalachia, Dec. 1881, v. 2, p. 331-336.)

Habits of *b. arthemis* in its different stages, and comparison of this with other allied butterflies. *G: D.* (2906)

Specht, Friedrich, *see* Martin, P. L. Die Praxis der Naturgeschichte . . . [Rec., 2903].

Steudel, W., *see* Martin, P. L. Die Praxis der Naturgeschichte . . . [Rec., 2903].

ENTOMOLOGICAL ITEMS.

Dr. C. V. Riley calls attention, in the *American naturalist* for August 1882, to *Doryphora juncta* as an enemy of the egg-plant, in Georgia.

Mr. James T. Dewey records, in the *Entomologist* for Jan. 1882, the capture of a large number of lepidoptera around an electric light in Eastbourne, England.

According to a paper by Miss Mary H. Hinckley in the *American naturalist* for August 1882, the tree-toad (*Hyla versicolor*) feeds at first upon aphides but later its chief food is flies; both kinds of insects are taken only when alive.

A monstrosity in a specimen of *Melolontha vulgaris* is described in the *Entomologische nachrichten* for 15 June 1882. This specimen has three feet on the left posterior leg. The leg is about two millimetres shorter than the corresponding leg on the other side of the insect.

In the meeting of the Linnean society of London, on 16 March 1882, Mr. Smith showed a bee caught alive in England, which had a profuse growth of the *Isaria* form of *Cordiceps sphecocephala*, a West Indian form, the latter genus being closely allied to *Claviceps*, or ergot.

In the *Entomologische nachrichten* for 1 Sept. and 15 Oct. 1882 are two short but interesting communications, one by Bieger and one by Gauckler, on the effect of the food-plants of lepidopterous larvae on the production of varieties. The species upon which results were recorded are *Bombyx quercus*, *Arctia caja* and *Hadena pisi.*

"Messrs. Wilkinson and Lawson, I have heard, used to place their rubbish" from flooding of rivers "in a sieve, with a bag underneath, and then put a little ammonia amongst it: the beetles immediately rushed away to escape from the fumes, fell into the bag, and so were easily eliminated and captured; I have never tried this plan, but it seems feasible, unless the ammonia should kill the smaller and more delicate species before they could escape. A basin with steep sides is the best vessel in which to examine flood-refuse." "The rubbish may be kept for a long times, and yet be productive. It is always as full of larvae as of beetles, and these will breed out and fresh species keep appearing."—W. W. Fowler in the *Entomologist*, June 1882, v. 15, p. 125.

In the May (1882) meeting of the Linnean Society of London, Mr. P. H. Gosse made a communication "dealing with clasping organs auxiliary to the generative parts in certain groups of lepidoptera. After preliminary remarks the author mentions his mode of manipulation, and proceeds to a description of the organs in question, finally dealing with the modification of the apparatus as investigated in a very considerable number of the species of the genera *Ornithoptera* and *Papilio*."

Dr. O. Schmiedeknecht, of Gumperda, in Thüringen, read a paper at one of the monthly meetings of the "Irmischia," at Erfurt, recently, a short report of which appears in the *Entomologische nachrichten*, 15 Nov. 1881, jahrg. 7, p. 321-323; in which he enumerated a large number of European species of *Bombus* which are subject to wide variation, describing their variant colorational characters, and stating that even the male characters, which must be relied on for specific discrimination, are variable to some extent. Probably similar differences are to be detected in our own species.

Dr. Julius Nathan notices the lack of sensitiveness of larvae of *Eristalis* to bad odors, in *Kosmos*, jahrg. 6, p. 298. Having had his attention called to the subject by an experiment of Darwin's, he sought to stupefy the larvae of *Eristalis tenax*, in the same way as he had done with lepidopterous larvae. The larvae of *Eristalis*, however, took no notice of small quantities of chloroform; it was only after Dr. Nathan used an amount of chloroform sufficient to stupefy a child that he brought about a suspension of motion of the larvae. He concludes therefrom that the larvae of *Eristalis*, which inhabit stinking water, are only slightly sensitive to strong-smelling substances.—Tr. from *Entomogische nachrichten*, 15 Aug. 1882, jahrg. 8, p. 232.

A NEW MUSEUM PEST.—Mrs. A. E. Bush, an esteemed correspondent of San José, Cal., complains lately in her letters of the ravages of a dermestid in her insect collection, and from specimens, larvae and imagos, lately sent to us, we find that the species in question is the handsome *Perimegatoma variegatum* Horn. We do not find that this species was ever known before as a museum pest, and there is danger that it may become distributed in insect collections all over the country, just as have the other species of the same family, which are so well-known and dreaded by entomologists.—*Amer. naturalist*, Oct. 1882, v. 16, p. 826.

DR. BERGMANN has lately shown that formic and acetic acids are met with, as constituents of protoplasm, throughout the whole vegetable kingdom, and can be regarded as constant products of metastasis in vegetable protoplasm. It is very likely that formic acid, at least, will be found in all insects, as soon as they have been carefully studied. Dr. Bergmann thinks it probable that propionic, butyric, caproic, or even this whole series of acids, are universally distributed in the vegetable kingdom. There are however, in my opinion, certain arresting processes in the retrogressive tissue-metamorphosis that cause insects to develop usually for the most part formic, sometimes butyric, rarely—as in beeswax—cerotic acid. *G: D.*

WE QUOTE the following interesting note by J. Jenner Weir, from the *Entomologist* for July 1882: "Danaine butterflies not subject to the attack of mites.—In the Proceedings of the Entomological society for the year 1877, p. xii, Mr. Meldola remarks that 'he had observed that certain distasteful species of lepidoptera preserved their disagreeable qualities after death, in proof of which he exhibited some butterflies found among an old collection of Indian insects, the greater part of which had been demolished by mites. The surviving specimens were all of protected species, viz., four of a *Euploea*, one of *Danais plexippus*, and one of *Papilio pammon*. *Euploea* and *Danais* were well known to be protected genera, since they serve for models of mimetic resemblances. With regard to *Papilio pammon*, Mr. Meldola stated that, in his belief, it was in some way distasteful, as he had seen it in swarms on the island of Nancoury, Nicobar islands, in April, 1875.' In Mr. Meldola's valuable translation of Dr. Aug. Weismann's 'Studies on the theory of descent,' p. 337, the translator, in a footnote, makes a similar statement. I lately became possessed of four cases of Indian lepidoptera, which had been almost entirely destroyed by mites, but the danaine butterflies were uninjured: there was one species of *Euploea* and four of *Danais*, including *D. chrysippus*, *D. limniace*, and *D. plexippus*; the specimens of *Papilio pammon* were also in fair condition."

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No. 100 was issued 15 Jan. 1883.

PSYCHE,

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

[Established in 1874.]

EDITED BY

G: DIMMOCK, *Cambridge, Mass.;* B: PICKMAN MANN, *Washington, D.C.;*
ALBERT J: COOK, *Lansing, Mich.;* CLIFFORD CHASE EATON, *Cambridge,*
Mass.; FRANCIS HUNTINGTON SNOW, *Lawrence, Kansas.*

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Vol. 3. Nos. 103-104.

NOVEMBER–DECEMBER 1882.

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CAMBRIDGE, MASS., U. S. A.: PUBLISHED BY GEORGE DIMMOCK.

YEARLY SUBSCRIPTIONS, $2. VOLUME, $5. MONTHLY NUMEROS, 20 c

[Entered as second class mail matter.]

PSYCHE, Organ of the Cambridge Entomological Club.

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THE COCOONS OF *CIONUS SCROPHULARIAE.*

BY GEORGE DIMMOCK, CAMBRIDGE, MASS.

The cocoons of *Cionus scrophulariae* furnish an illustration of striking similarity of form of insect structures to parts of a plant. Geoffroy[1], in 1762, without, of course, perceiving any cause for this similarity, writes of this species: "When their larvae, after having devoured the leaves of the Scrophularia, have arrived at their full size and are ready to transform, they make at the tip of the stems a sort of slightly transparent bladder in which they enclose themselves and undergo their metamorphosis. This round and quite firm bladder appears to be produced by a viscid moisture with which the larva is covered. How can the insect form this round vesicle with this sort of glue? This I have been unable to perceive. I have only found the larvae just enclosed in this vesicle; I have seen them there under the form of pupae, and finally the perfect insect has come out of them before my eyes. These vesicles are of the size of the shells which contain the seeds of the Scrophularia and are often mingled with them; but they are easily distinguished by their transparency and by their round form that differs from the fruit of the Scrophularia, which terminates in a point." Again the same author writes, "This larva forms at the extremity of the branches, near the flower-buds a round shell resembling a bladder, where it undergoes metamorphosis and from which, at the end of several days, I have seen the perfect insect emerge." The preceding is the earliest mention I have found of the cocoons of *Cionus*. About a dozen writers have since written notes upon and descriptions of the cocoons of the genus.

Hermann Müller[2], in 1879, figures cocoons of *C. scrophulariae* on a sprig of *Scrophularia nodosa* and writes of them, "We find a still more delusive similarity of cocoons to other objects, and indeed in this case to objects immediately around them, that is to the ovaries of the plant on which they are found, in a common little curculionid, *Cionus scrophulariae*, which feeds in the larval state upon the leaves of *Scrophularia nodosa* and spins itself for pupation into brown oval cocoons on the blossom and fruit stems of the same plant. These cocoons, placed among the ovaries of the plant, can scarcely be distinguished from them, altho the cocoons are neither pointed nor do they have the cleft which separates, even exteriorly, the capsule into two halves."

---

[1] Geoffroy, E. L. Histoire abrégée des insectes qui se trouvent aux environs de Paris . . . 1762, v. 1, p. 277, 297.

[2] Müller, H. Schützende aehnlichkeit einheimischer insekten. (Kosmos, bd. 6, p. 119.)

The cocoon, as has been mentioned by other writers, is usually fastened to a pedicel of one of the ovaries just beneath the ovary itself, being readily distinguishable from the ovary by its transparency and form, and the end of the cocoon farthest from the ovary is cut off like a roundish lid by the beetle in emerging.

I find no correct notice, however, of the little punctures which dot the cocoon. These holes have an appearance as if pricked from within the cocoon with a fine needle, for their margin is somewhat elevated outside, as is the edge of a needle-hole in paper. The diameter of the holes themselves is 0.05 mm. to 0.06 mm., and they are scattered about on the sides of the cocoon at quite irregular distances from each other. On the end of the cocoon toward the ovary of the plant, which is usually also the upper end of the cocoon, these punctures are very rarely to be found, but on the other end of the cocoon they are as abundant as they are upon the sides.

The function of these punctures is, probably, to admit air to the enclosed pupa, for the cocoon-material itself is very firm in texture and impervious both to water and to air. The protrusion of the margins of each puncture is apparently to prevent the entrance of water. The exterior surface of the cocoon is not, as is often the case with such structures, repellent to water; it moistens readily, but these punctures mostly remain open while it is moist. They furnish thus an inlet for air, an outlet for the moisture emanating from the pupa during its metamorphosis, and still they prevent the entrance of water in rainy weather; their rarity or absence from the upper end of the cocoon being apparently further protection from the force of raindrops. Quite possibly, too, the protruded margins of the punctures prevent the entrance of spores of fungi which would be injurious to the pupa.

Westwood[3] describes the cocoon of *C. scrophulariae* as "formed with open meshes, like that of the *Hyperae*." This statement by Westwood, probably made upon the authority of Schäffer[4] is criticized by Osborne,[5] who writes, "These cocoons are prolate spheroids, lemon-shaped, but not pointed at the ends, and are sparsely covered in the middle region with raised whitish 'goose-skin' points, which appear to be produced by the subsequent filling up of small openings left in the original making of the cocoon. A cocoon seen in the unfinished state would present cribriform openings, but would not even then be like the network cocoon of *Hypera*." Osborne writes further: "The pupae at first are extremely delicate, almost like transparent glass;

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[3] Westwood, J. O. An introduction to the modern classification of insects . . . 1839, v. 1, p. 343.

[4] Schäffer, J. C. Abhandlungen von insekten, . . . 1779, v. 3, pl. 9.

[5] Osborne, J. A. On the cocoons formed by *Hypera rumicis* and its parasites and *Cionus scrophulariae*. (Entom. mo. mag., 1879, v. 16, p. 16-18.)

become greenish or whitish and opaque after some time; and, if exposed to too dry an atmosphere, both pupation and the exclusion of the imago are rendered impossible or difficult. Therefore, I imagine a close, membranaceous cocoon is a necessity."

I have found, in examining a large number of specimens of cocoons of *C. scrophulariae*, no exception to the existence of punctures in them, altho the punctures are never large enough to be termed open meshes. Were it not for these punctures the cocoons of *C. scrophulariae* would be, to all appearances, hermetically sealed. This is not the case with the cocoons of *bombycidae*, as can be seen readily, by covering a portion of a cocoon with soapy water and blowing through the portion to be tested. The numerous bubbles which form on the outside in such an experiment are clear proof of the passage of air through the cocoon-walls. Even the very compact inner lining of the cocoon of *Attacus promethea* readily allows the passage of air.

Treated with dilute acids the cocoon of *C. scrophulariae* shows little change; alkalies dissolve out of it, as they do out of cocoons of *bombycidae* and even out of portions of insects themselves, a brownish-yellow coloring matter, which loses its color on being acidulated, and regains it upon again making the solution alkaline. The whole cocoon of *C. scrophulariae* is soluble in strong nitric acid.

NOTES ON *PTEROPHORIDAE* OF NORTH AMERICA. 2.

BY GEORGE DIMMOCK, CAMBRIDGE, MASS.

In the list of references concerning *pterophoridae* which I published in Psyche, Sept.-Oct. 1883, v. 3, p. 402-404, I omitted, by some accident, all references to a paper published by Dr. D. S. Kellicott in the Bulletin of the Buffalo society of natural sciences for January 1882, and afterwards as a separate. Wishing to make my notes as complete as possible I add the following data taken from that paper, the title of which is "Notes on the larvae of some local *pterophoridae*."

Platyptilus carduidactylus Riley. Kellicott (Bull. Buffalo soc. nat. sci., Jan. 1882, v. 4, p. 47) gives notes on the larva and pupa of this species, and states that it is often parasited by a variety of *Ichneumon humilis*, Provancher.

Oedematophorus cretidactylus Fitch (1st and 2nd Repts. nox. ins. N. Y., 1856, p. 142). Kellicott (Bull. Buffalo soc. nat. sci., Jan. 1882, v. 4, p. 48-50) describes the larva and pupa of this species. The gregarious larvae feed upon *Eupatorium purpureum*, the leaves of which they fasten together with a web. N. Y., Cal., Vancouver's Isl.

Lioptilus homodactylus Walk. Kellicott (Bull. Buffalo soc. nat. sci., Jan. 1882, v. 4, p. 48-50) describes larva and pupa of this species. The gregarious larvae feed among leaves of *Eupatorium purpureum* which they have webbed together. Buffalo, N. Y.

Aciptilus montanus, Wlsm. Kellicott (Bull. Buffalo soc. nat. sci., Jan. 1882, v. 4, p. 51-52) describes larva and pupa; the former feeds upon the leaves of different species of *Solidago*. Buffalo, N. Y.

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CAMBRIDGE, MASS., NOV.-DEC. 1882.

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EDITORIAL NOTICE.

In closing the third volume of PSYCHE with this double numero and the indexes which accompany it, the editors certainly owe an apology to the subscribers who have waited over two years for the completion of the volume. The making of the Systematic index could not be carried to any considerable extent before the index to volume two was published, as the decimal classification of subjects in that volume was to be used as a basis for the classification in the present index. Causes similar to those which delayed the issue of the index to volume two also prevailed to some extent in the present case, but it is expected that the index to volume four will be prepared soon after the completion of the volume.

As was foreseen when volume three was begun, the form of recording then adopted for PSYCHE has enabled the editors to furnish record of more articles in this volume than were recorded in volumes one and two combined, viz., 1854 paragraphs, whereas volume one contained 715 and volume two 731 paragraphs. As in the earlier volumes, the index pages, though very elaborate and costly, are nearly all given in excess of the regular number of pages due to subscribers. The indexes are furnished only to subscribers to the whole volume, or for an extra charge of one dollar to subscribers for less than a volume.

After the issue of this numero the price of volume three of PSYCHE, either in ordinary form or printed on one side of the sheet, will be five dollars, the same price as is charged for volume four, or two copies, one in each form, for six dollars; and after the small supply of broken sets of the volume is exhausted, only the complete volumes will be obtainable from the publisher.

G: D.

PROCEEDINGS OF SOCIETIES.

CAMBRIDGE ENTOMOLOGICAL CLUB.

(*Continued from p. 402.*)

12 MAY 1882—85th meeting. Col. T. W. Higginson, of Cambridge, Mass., and Mr. Leland O. Howard, of Washington, D. C. were elected active members of the Club.

Dr. H. A. Hagen exhibited slides of the female genitalia in *Clothilla* (a psocid), and *Prodoxus decipiens* (a tineid), showing the peculiar organs on the *vesicula seminalis*, whose probable function is to open the spermatophores. Dr. Hagen showed plates illustrating these organs. In *Clothilla* this organ is a horny plate with teeth to open spermatophores and holes at the base of the teeth to let in spermatozoa. He mentioned the fact that, in *Prodoxus*, the whole length of the *vesicula seminalis* was nearly one-half that of the insect and nearly filled the abdomen.

Dr. H. A. Hagen mentioned the familiar red-spotted appearance of the testes and spermatophores in *Danias archippus*.

Mr. S. H. Scudder stated that he had received, that day, from Mr. J. S. Kingsley, of Worcester, Mass., living specimens of a species of *Scolopendrella* differing from that mentioned by the speaker at the last meeting of the entomological section of the Boston society of natural history, and which Mr. Kingsley called *S. ryderi.* It seemed to be closely allied to, if not the same as, Packard's *S. americana.*

Dr. H. A. Hagen called attention to the similarity between the fossil, considered thysanuran by Mr. Scudder, mentioned at the last meeting, and the early stages of *Hydrachna.*

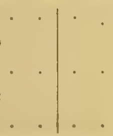
Dr. H. A. Hagen mentioned the longevity of the larvae of *Prodoxus*, he having larvae now which have been living since 1879.

Voted that when we adjourn it should be until the regular date of meeting in October.

13 OCT. 1882.—86th meeting. Mr. S: H. Scudder called attention to the three plates of Buckton's "Monograph of the British aphides" on which are figures of fossil species, including those from amber.

Dr. H. A. Hagen recommended that the author's attention be called to the collection of insects from amber, possessed by Künow, of Königsberg, Germany.

Dr. H. A. Hagen called attention to the tracks made by the larvae of *gomphidae.* These tracks consist of two series of foot-prints due to the different distances of the feet from the median line. Dr. Hagen thought that he had seen similar marks on rocks. [See *Nature*, 21 Dec. 1882, v. 27, p. 173, for further details.]



Mr. G: Dimmock showed eggs, cocoons and imagos of *Eugonia alniaria*, and made remarks on the earlier stages of this species.

Mrs. A. K. Dimmock exhibited leaves of the syringa, *Philadelphus coronarius*, which had been mined by the larva of a dipteron, of which pupae and imagos were shown. The mines were characterized by a peculiar arrangement of the excrement of the larvae in little curves, and were very abundant about Cambridge.

Dr. H. A. Hagen, spoke of mines caused by dipterous larvae in the leaves of nasturtium (*Tropaeolum*), and Mr. Dimmock of mines of dipterous larvae in leaves of dock (*Rumex*), about Cambridge.

Mr. G: Dimmock said that the odor so noticeable when larvae of *Attacus cecropia* were handled came from glands situated in each of the tubercles of the larvae. [For further details see PSYCHE, v. 3, p. 387.]

Mr. S: H. Scudder called attention to the poison of the larvae of a species of *Lagoa.* When allowed to crawl upon the arm, or upon any tender part of the skin, this larva leaves behind it a pathway which soon becomes red and often quite severely painful.

Mr. R. Hayward described some experiments which he had made to test the stinging power of *Hyperchiria io.*

Dr. H. A. Hagen, after giving the reasons why a late entomological excursion by Mr. S: Henshaw and himself was made to Washington Territory, remarked upon the synonymy of some species of *Papilio* found on the excursion. At Yumatilla, Oreg., and across the river from there, in Washington Territory, a species of *Papilio.* supposed to be *P. machaon*, was taken in company with *P. zolicaon.* Later it was found that *P. zolicaon* and *P. oregonus* were the same species. *P. oregonus* is very closely like *P. aliaska.* All of these are only climatic or regional variations of *P. machaon*, which extends around the northern hemisphere as a series of remarkable varieties. *P. rutulus* and *P. turnus* when compared show that the former is a western and the latter an eastern form; the differences are slight and not constant in each species. *P. rutulus* has, however, no dark-colored female. *P. rutulus* is found as far east as between Salt Lake, Utah, and Fort Bridger, Wyom. *P. daunus* and *P. rutulus* are probably also synonyms, altho more and better material is needed to decide this point. Dr. Hagen then discussed larval characters in some species of *Papilio*, especially in *P. machaon.*

Mr. G: Dimmock believed that larvae of *Attacus polyphemus* could pupate, if driven by hunger, before the last larval stage, and mentioned that he had a number of dwarf cocoons produced by keeping the larvae hungry. Larvae of *Thyreus abbotii*, of which both dimorphic larval forms are common in Cambridge, possibly sometimes drop one larval stage.

Mr. G : Dimmock was elected secretary and Mr. B : P. Mann treasurer, in place of Mr. W : Trelease, whose resignation of the office of secretary-treasurer was announced.

10 Nov. 1882.—87th meeting . . .

Dr. H. A. Hagen called attention to the subject of acceleration of development in the larvae of lepidoptera, and especially to its occurrence where many larvae are crowded together. After referring to some cases mentioned in his paper "On some insect deformities" (Memoirs Mus. comp. zool., May 1876, v. 2, no 9), Dr Hagen said that *Pieris menapia* sometimes so hastens the process of pupation, when crowded, that the pupa lacks the usual encircling thread and is only suspended by the tip of the abdomen, and, in one case the process was so hurried that only the anterior part of the chrysalis was formed.

Mr G : Dimmock exhibited dwarf cocoons of *Attacus polyphemus*. the dwarfing of which was produced by starving the larvae. The average weight of the ten dwarf cocoons exhibited was 1.2 grams, while the average weight of nine cocoons from larvae reared in similar circumstances, but not starved, was 3.8 grams. It is possible to make the larva of *A. polyphemus* spin a cocoon when it is only between 2.5 and 3 cm. long, by gradually diminishing its food-supply; this formation of dwarfs by starvation is not possible, to the same marked extent, with larvae of *A cecropia*, *A. promethea* or *A. luna*. The lightest weight of any cocoon of *A. polyphemus* possessed by Mr. Dimmock was 0.2 gram, but this cocoon was occupied by a dead larva. Next in weight was one which weighed 0.3 gram, and which contained a cocoon of an ichneumon. Parasitism usually reduces the weight of cocoons. The most promising dwarf cocoon was one weighing 1.8 grams, which was very sensitive to disturbance, the pupa within it writhing about on slight touch. The pupa of *A. luna* are usually much more sensitive than those of *A. polyphemus*; their weight is generally less, however; the average weight of seven well-developed cocoons of *A. luna* was only 2 grams. The weights of all the above-mentioned cocoons are probably slightly less than they would be if the larvae had been reared in the open air.

Dr. H. A. Hagen showed a very large specimen of the *hippoboscidae*, probably a new species, which had been found on a swallow. Its length was one centimetre; it had no ocelli; its wings were rudimentary, not broken off, as is usually the case with the females of *hippoboscidae*, and the rounded rudiments of wings had veins and a marginal fringe. Dr. Hagen alluded further to the number of species of the family and to the wide distribution of each species.

Dr. H. A. Hagen exhibited egg-shells of a hemipterous insect, which were found on a grape-vine in California. At first sight the eggs would be mistaken for those of some species of *bombycidae*, being white banded with brown, and barrel-formed. The first larval skin remained within the eggs together with a little three-pointed egg-burster. Dr. Hagen then described the modes by which some larvae with sucking mouth-parts escape from the egg, drawing especial attention to the cephalic saw by which the larva of *Chrysopa* and of other *hemerobidae* extricate themselves from their eggs.

Mr. R. Thaxter showed a larva of *Papilio cresphontes* taken by Mr. N. Coleman, in Berlin, Conn., 13 Oct. 1882. This species has been found a few years past about Berlin, Conn.

Mr. G : Dimmock mentioned that out of about a dozen pupae of *Thyreus abbotii* which he attempted to carry to Germany, in 1879, not a single specimen survived the voyage. Dr. Hagen remarked on the modes of packing best suited for carrying pupae on oceanic voyages.

Mr. G. Dimmock stated that, in seven hours, collecting near Mt. Wachusett (in Princeton, Mass.), 26 Aug. 1882, he had taken 96 larvae of lepidoptera belonging to 44 species; among these were 18 larvae (9 species) of *geometridae*. In one hour's collecting, near Waverly, Mass., 30 Aug. 1882. he had taken 19 specimens (9 species) of lepidopterous larvae. In both cases many specimens had been rejected as undesirable.

Dr. H. A. Hagen called attention to Prof. J. D. Whitney's new work, entitled "The climatic changes of later geological times"... Cambridge (Memoirs Mus. comp. zool., v. 7, no. 2, part, 3) 1882, as showing how, after much had been written concerning the influence of the great glacial sheet, that was supposed to have once covered North America, upon the distribution of insects, that, in the opinion of Prof. Whitney, the glacial sheet itself had never existed to the extent that had been supposed.

18 Dec. 1882.—88th meeting. Mr. W: H. Ashmead, of Jacksonville, Fla.; Prof. R: E. Call, of David City, Neb.; Mr. S: E. Cassino, of Boston, Mass.; and Mr. C: Fish, of Brunswick, Me. were elected active members.

Dr. H. A. Hagen said that he had long thought that the thorax of insects is divided into more parts than had been generally supposed, that is, that each of its three segments was divisible into three smaller parts. Entomologists would object to this view of the structure of the thorax on account of development. In Balfour's Comparative embryology we find that author regards ancestral forms as better indicated in the larvae, especially if the larval life is long, than in the egg. This removes objections. Dr. Hagen had corresponded with Dr. Fritz Müller, who would now, perhaps, extend this subdivision of the segments to those of the abdomen. In answer to a question if the ganglionic arrangement of the nervous system was not an objecton to these views, Dr. Hagen said that, on the contrary, there were really three pair of ganglia in each segment.

Mr. G: Dimmock exhibited dwarfs of *Colias philodice* (extreme possible expanse of wing, 37 mm.), *Papilio polyxenes* (same measurement, 65 mm.), and *Pyrameis huntera* (same measurement, 50 mm.). The dwarf of *Papilio polyxenes* was produced by keeping the larva and pupa in a dry room. It emerged from pupa 27 March 1871. The *Colias philodice* was said by Dr. Hagen to be the form described by Fitch as *C. santas;* it was taken in Springfield, Mass.

Mr. Wyllis A. Silliman remarked that a species of white ant (*Callotermes flavicollis?*) collected at Banyuls-sur-mer, Pyrénées-Orientales, France, is infested with the same organisms that Prof. Joseph Leidy has recently described (Proc. Acad. nat. sci., Philad., 1880, ser. 2, v. 8, p. 425-447. pl. 51-52) from the intestine of *Termes flavipes* of this country. Altho in doubt as to the position of these forms in the scale of life, Mr. Silliman thought that several of them are only stages of one species, and that the so-called "*Vibrio termitis*" of Leidy is the spermatozoon of *Pyrsonympha agilis.* In fact, the "pharyngeal sac" (Leidy) of the latter species is always filled with "Vibrios," which are seen to escape, under pressure, from an anterior orifice. *P. agilis* has no stomach, but the protoplasm of the posterior part of the body carries on an intracellular digestion.

Mr. G. Dimmock briefly described the general appearance of a very large species of gregarina which he had found abundantly in the intestine of *Scolopendra morsitans*, during March, April, and May, 1882, about Banyuls-sur-mer, Pyrénées-Orientales, in France. The full-grown parasites were from six to eight millimetres in length, and had a peculiarly formed cross-piece at the larger end; the smaller end tapered gradually to a point as it does in many species of gregarina.

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

A colon after initial designates the most common given name, as: A: Augustus; B: Benjamin; C: Charles; D: David; E: Edward; F: Frederic; G: George; H: Henry; I: Isaac; J: John; K: Karl; L: Louis; M: Mark; N: Nicholas; O: Otto; P: Peter; R: Richard: S: Samuel; T: Thomas; W: William. The initials at the end of each record, or note, are those of the recorder.

Corrections of errors and notices of omissions are solicited.

Claypole, E: Waller. The scientific names of insects. (Can. entom., April 1879, v. 11, p. 61-64.)

Crit. rev. of G: D. Hulst's article with same title (Can. entom., Feb. 1879, v. 11, p. 22-25) [Rec., 2920]. Hulst's statement that "A feminine name must not be joined to a masculine noun" is attacked, and citations from classical Latin authors and of the usage of the Latin and Romance languages are given to show that "We have therefore abundant classical authority for linking nouns of different genders in apposition in the same name." *G: D.* (2907)

Devereaux, Willard Loomis. Captures of *noctuidae* at Clyde, Wayne co., N. Y. (Can. entom., June 1879, v. 11, p. 105-110.)

List of *noctuidae*, principally taken at sugar, with notes as regards rarity and date of capture; to this is added a list of coleoptera seen at sugar, and it is noted that *hyla versicolor* and *bufo americanus* attend the bait to capture insects. *G: D.* (2708)

Edwards, W: H: [Correction.] (Can. entom., Apr. 1879, v. 11, p. 79-80.)

Correction of the author's "Descriptions of new species of butterflies collected by Mr. H. K. Morrison" . . . [Rec. 2910]. *G: D.* (2909)

Edwards, W: H: Descriptions of new species of butterflies collected by Mr. H. K. Morrison, in Nevada, 1878; also, Remarks on some errors of synonymy and arrangement. (Can. entom., March 1879, v. 11, p. 49-56.)

Correction, by W: H: Edwards. (Can. entom., Apr. 1879, v. 11, p. 79-80.)

Describes three new species of butterflies, *argynnis laura, satyrus paulus*, and *pholisora oricus*, all from Nevada; notes on the synonymy and grouping of certain North American species of *argynnis*. *G: D.* (2910)

Edwards, W: H: Descriptions of new species of North American butterflies; also, Notes upon certain species. (Can. entom., May 1879, v. 11, p. 81-89.)

Describes *argynnis hippolyta* (Oreg. and Cal.), *a. chitone* (Utah and Ariz.), and *anthocharis stella* (Nev. and Cal.), 3 n. sp. of diurnal lepidoptera; gives synonymical and descriptive notes on *argynnis nitocris, papilio bairdii, p. asteroides* (Reakirt, nec Strecker) and on *anthocharis thoosa*. *G: D.* (2911)

Edwards, W: H: Notes upon the preparatory stages of certain species of butterflies. No. 1. (Can. entom., July 1879, v. 11. p. 127-131.)

Describes larva and chrysalis of *eresia texana*, the chrysalis of *phyciodes vesta*, and the egg, larva and chrysalis of *melitaea baroni;* directions how to pack eggs and larvae of butterflies for sending by mail. *G: D.* (2912)

Grey, Robert Melrose. Remarks, critical and suggestive, on the genus *limenitis* east of the Mississippi. (Can. entom., Jan. 1879, v. 11, p. 16-17.)

Rev., by A: R. Grote. (Can. entom., Feb. 1879, v. 11, p. 40.) [Rec., 2917.]

Believes that *limenitis ursula, l. disippus*, and *l. proserpina* "are plastic forms of one species"; notes on colorational variations sometimes occurring in the first two species. *G: D.* (2913)

Grote, A: Radcliffe. [Bibliographical record of Psyche.] (Can. entom., Apr. 1879, v. 11. p. 79.)

Objects "to the interjectional criticisms in the Bibliographical record of *Psyche*," with especial reference to the note of Rec. 1101, and adds, "In the present case the criticism is essentially hasty and bad, but, if my friendly advice to avoid such matters in future be taken, I think it will not prove entirely unfortunate for the publishers of *Psyche*." *G: D.* (2914)

Grote, A: Radcliffe. Descriptions of two species of *agrotis*, and two of *apatela*. (Can. entom., March 1879, v. 11, p. 56-59.)

Describes, as new species, *agrotis vocalis*, *a. vernilis*, and *apatela parallela*, from Colorado, and *apatela distans*, from Canada. *G: D.* (2915)

Grote, A: Radcliffe. On *graphiphora* and new N. Am. *noctuidae*. (Can. entom., Feb. 1879, v. 11, p. 26-29.)

Transfers to *graphiphora* some species hitherto considered to belong to *mamestra*, *dianthoecia*, *himella*, and *acerra;* describes three new species, *g. garmani* (from Ill.), *g. perbrunnea* and *heliophila dia* (both from Cal.). *G: D.* (2916)

Grote, A: Radcliffe [On *limenitis*.] (Can. entom., Feb. 1879, v. 11, p. 40.)

The author regards the intermediate forms of the species of *limenitis* mentioned in R. M. Grey's "Remarks, critical and suggestive, on the genus *limenitis* east of the Mississippi" (Can. entom., Jan. 1879, v. 11, p. 16-17) [Rec., 2913], as "in an intermediate position between varieties and species." *G: D.* (2917)

Harrington, W: Hague. [Notes on insects.] (Can. entom., June 1879, v. 11, p. 119-120.)

Notes rarity of lepidoptera about Ottawa, Canada, in the early part of 1879; notes on *buprestidae*, on species of *monohammus*, and on *epicauta cinerea*, *chelymorpha cribraria* and *cicindela longilabris*. *G: D.* (2918)

Hulst, G: Duryea. [Correction.] (Can. entom., Apr. 1879, v. 11, p. 80.)

Correction of the author's "The scientific names of insects" (*op. cit.*, Feb. 1879, p. 22-25) [Rec., 2920]. *G: D.* (2919)

Hulst, G: Duryea. The scientific names of insects. (Can. entom., Feb. 1879, v. 11, p. 22-25.)

Crit. rev., by E: W. Claypole, with same title. (Can. entom., Apr. 1879, v. 11, p. 61-64.)

Correction, by G: D. Hulst. (Can. entom., Apr. 1879, v. 11, p. 80.)

An appeal to entomologists to use more correct Latin in constructing scientific names of insects, and numerous names chosen to illustrate the different points discussed. *G: D.* (2920)

Imhof, Othmar Emil. Beiträge zur Anatomie der *perla maxima* Scopoli. Inaugural-dissertation . . . Universität Zürich. Aarau, 1881. t.-p. cover, 41 p., 2 double pl., 23 × 16, t 16.5 × 10.4.

Notice, by H. A. Hagen. (Zool. Jahresber. f. 1881. 1882, Abtheil. 2, p. 126.)

Anatomy of the central nervous system, digestive tract and sexual system of *perla maxima*, with especial notice of the egg and its structure. *G: D.* (2921)

Kaltenbach, J. H. Die Pflanzenfeinde aus der Klasse der Insekten. Ein nach Pflanzenfamilien geordnetes Handbuch sämmtlicher auf den einheimischen Pflanzen bisher beobachteten Insekten zum Gebrauch für Entomologen, Insektensammler, Botaniker, Land- und Forstwirthe und Gartenfreunde. Stuttgart, *Julius Hoffmann*, 1874. t.-p. cover [dated 1872], 2 t.-p. [= p. 1-4] + p. 5-8 + 848 p., 402 figs. of plants.

Rev., by A. Müller, entitled "Moritz Isenschmid's Zusätze." . . (Mitth. Schweiz. entom. Gesells., 1880, bd. 5, p. 575-576.) [Rec. 1761.]

Contents: Preface, p. 1-4; list of insects found upon different native phaenogamous plants of Germany arranged in the order of the plants, with notes about the insects and often figures of the plants, p. 1-768; additions, p. 769-793; alphabetical indexes (Latin names of plants, German names of plants, genera and species of coleoptera, species of lepidoptera, genera and species of hymenoptera, genera and species of diptera, genera—and in some cases species—of orthoptera, genera and species of hemiptera, genera and species of acarina), p. 794-846; errata, p. 847-848. Many of the insects mentioned are also found in North America. *G: D.* (2922)

Kellicott, D: Simons. Observations on *nephopterix* [sic] *zimmermani*. (Can. entom., June 1879, v. 11, p. 114-116.)

Notes on the habitats, habits and parasites of *nephopteryx zimmermani*. *G: D.* (2923)

Lintner, Joseph Albert. Description of a new species of *anisota*. (Can. entom., Jan. 1879, v. 11, p. 10-12.)

Describes *anisota bisecta* n. sp., from Racine, Wisc. *G: D.* (2924)

MacLeod, Jules. Notice sur l'appareil venimeux des aranéides. (Arch. de biol., 1880, v. 1, p. 573-582, pl. 24.)

Separate. [Gand, 1880.] t.-p. cover, 10 p., pl. 24, 24 × 16, t 17 × 9.7.

Abstract, entitled, "The poison apparatus of spiders." Amer. nat., March [24 Feb.] 1881, v. 15, p. 236.)

Abstract. (Zool. Jahresber. f. 1880, 1881, abth. 2, p. 69.)

Abstract. (Bericht . . . der Entomologie . . . 1880. 1882, p. 58.)

Anatomy and histology of poison-glands of spiders, illustrated by those of *pachygnatha*, *marpissa*, *tegenaria*, *clubiona*, and *agelena*. *G: D.* (2925)

Patton, W: Hampton. On certain hymenoptera. (Can. entom., Jan. 1879, v. 11, p. 12-15.)

Allantus basilaris devours other insects; compares its habits with those of other predaceous saw-flies as observed in Europe; resemblance of mandibles of *allantus* to those of *cicindela;* distinguishing characters of *a. basilaris* and *a. dubius;* description of female of *xiphydria attenuata* and a note on its parasite, *rhyssa humida*. *G: D.* (2926)

Patton, W: Hampton. Descriptions of several new *proctotrupidae* and *chrysididae*. (Can. entom., Apr. 1879, v. 11, p. 64-68, fig. 13.)

Describes five new species of hymenoptera, as follows: *proctotrupes crenulatus, gonatopus contortulus, notozus marginatus, chrysis verticalis* (all from Conn.), *ch. martia* (from Canada), and *cleptes aliena* (from Wyom.). *G: D.* (2927)

Patton, W: Hampton. Notes on three species of *xylocopa*. (Can. entom., March 1879, v. 11, p. 60.)

Gives synonymy of *xylocopa micans;* describes *x. varipuncta*, a new species from Arizona, and notes that *x. fimbriata* has been found in California. *G: D.* (2928)

Pott, Karl Friedrich Robert. Vergleichende Untersuchung über die Mengenverhältnisse der durch Respiration und Perspiration ausgeschiedenen Kohlensäure bei verschiedenen Thierspecies in gleichen Zeiträumen nebst einigen Versuchen über Kohlensäureausscheidung desselben Thieres unter verschiedenen physiologischen Bedingungen. Habilitationsschrift...Universität Jena. Jena, 1875. t.-p., dedic. p., 88 p., 22 × 14, t 16 × 10.

Experiments on the amount of carbonic dioxide [CO_2] exhaled by different animals; p. 30-38, 43-44, 50-52, and 73-78 contain accounts of experiments on insects, of which the author experimented upon larvae of *geotrupes vernalis, carabus, pieris brassicae, sphinx ligustri, cossus ligniperda* and *euprepia caja;* pupa of *sphinx ligustri;* and imagos of *vanessa polychloros, locusta viridissima*, other species of *locustariae, gryllus campestris* and *pentatoma*. [The notes given in *Psyche*, Mar.-Apr. (24 Sept.) 1878, v. 2, p. 125-126, are from accounts of the same series of experiments.] *G: D.* (2929)

Reichenau, Wilhelm. Beiträge zur Biologie und Psychologie. 1. Ueber die Erscheinungen individueller und ererbter Erfahrung. (Entom. Nachrichten, 1 April 1879, Jahrg. 5, p. 93-95.)

Exemplification of results of supposed hereditary experience in insects contrasted with results of experience of individual insects. *G: D.* (2930)

Reichenau, Wilhelm. Beiträge zur Biologie und Psychologie. 2. Vermischtes: Witterungs- oder Bodeneinfluss, Ueberwinterung und Mordraupen bei Schmetterlingen. (Entom. Nachrichten. 1 June 1879, Jahrg. 5, p. 137-139.)

Variations of coloration due to temperature and moisture in *boarmia crepuscularia, hibernia leucophaearia, aglia tau, pararge megaera* and *pieris rapae;* hibernation of *brotolomia meticulosa* and *macroglossa stellatarum*, often between books in the library of the museum at Mainz; copulation, in early spring, of lepidoptera that have hibernated; various lepidopterous larvae that kill and eat larvae of their own or other species. *G: D.* (2931)

Saunders, W: E. [*Papilio thoas.*] (Can. entom., June 1879, v. 11, p. 120.)

Notes the occurrence of *papilio thoas* at Toronto, Canada, 11 May 1879, and thinks this early appearance of the butterfly indicates that it is double-brooded there. *G: D.* (2932)

Siewers, C: Godfrey. The tails of *callimorpha interruptomarginata* ♂. (Can. entom., March 1879, v. 11, p. 47-48, fig. 12.)

Brief description of a pair of evaginable hairy appendages, one on each side, near the anus of the male of *callimorpha interruptomarginata;* literature of some similar organs in other lepidoptera; regards them as aiding in flight. *G: D.* (2933)

Sprague, Frank Headley. Notes from Wollaston, Mass. (Can. entom., March 1879, v. 11, p. 46-47.)

· Reprint. (*op. cit.*, May 1880, v. 12, p. 100.) [Rec., 2004.]

Records captures of *colias eurytheme, limenitis arthemis* and *junonia coenia*. *G: D.* (2934)

Wailly, Alfred. Silk-producing and other *bombyces* reared in 1881. Part 2. (Journ. soc. arts, 31 March 1882, v. 30, p. 527-528, 54 cm.)

Reprinted in a separate entitled "Silk-producing *bombyces* and other lepidoptera reared in 1881" [Rec., 2938], *which see for notes.* *G: D.* (2935)

Wailly, Alfred. Silk-producing and other *bombyces* reared in 1881. Part 3 (Journ. soc. arts. 7 Apr. 1882, v. 30, p. 544-546, 94 cm.)

Reprinted in a separate entitled "Silk-producing *bombyces* and other lepidoptera reared in 1881" [Rec., 2938], *which see for notes.* *G: D.* (2936)

Wailly, Alfred. Silk-producing *bombyces* and other lepidoptera reared in 1881. [Part 1.] (Journ. soc. arts, 10 Mar. 1882, v. 30, p. 447-450, 122 cm.)

Reprinted in a separate of the same title [Rec., 2938], *which see for notes.* *G: D.* (2937)

Wailly, Alfred. Silk-producing *bombyces* and other lepidoptera reared in 1881. London, 1882. 8 p., 26 × 17, t (in 2 cols.) 21 × 13.

Reprint of author's "Silk-producing *bombyces* and other lepidoptera reared in 1881". Part [1-] 3 (Journ. soc. arts, 1882, v. 30: 10 Mch., p. 447-450 [Rec., 2937]; 31 Mch., p. 527-528 [Rec., 2935]; 7 Apr, p. 544-546 [Rec., 2936]). Contains biological notes on many species of *attacus*, their larvae, duration of pupal state, food-plants, crossings, hybrids, silk, etc. Notes are given on the following North American species of *bombycidae: telea polyphemus, samia gloveri, s. cecropia, s. ceanothi*, hybrid larvae of *s. cecropia* and *s. gloveri, hyperchiria io, orgyia leucostigma*, and *ceratocampa (eacles) imperialis.* *G: D.* (2938)

Weber, Max. Ueber eine Cyanwasserstoffsäure bereitende Drüse. (Archiv f. mikros. Anat., 1882, bd. 21, heft 3, p. 468-475, pl. 24.)

Notice. (Psyche, Aug. 1882 [15 Jan. 1883], v. 3, p. 583, 2 cm.)

The secretion of the glands in connection with the *foramina repugnatoria* of a species of myriapod, genus *fontaria*, contains hydrocyanic acid (HCN). *G: D.* (2939)

Wolff, R. Ueber die umwandlung des Cantharidins in den Canthariden. (Archiv der Pharm., Jan. 1877, jahrg. 56, bd. 210, 3te reihe, bd. 10, p. 22-30.)

Engl. abst. (New remedies, Apr. 1877, v. 6, p. 113.)

Experiments on the changes undergone by cantharidin in *lytta aspersa* when moisture is present; these changes attributed to presence of ammonia, since moisture alone does not alter cantharidin; results of some study of the properties of nitrogen-compounds of cantharidin. *G: D.* (2940)

Bibliographical Record of Contents of Volume three of Psyche.

Advertisements, *see names of respective advertisers.*

Austin, E: Payson. Natural history agency. (Psyche, Jan.-Oct. 1880, v. 3, p. 12, 24, 26, 50, 62, 74, 86, 98, 110, 122, *each* 4 cm.)

Advertisement. *G: D.* (2941)

Barnes, W:, *secretary pro tem.*, *see* CAMBRIDGE entomological club [Rec. 2955].

Bibliographical record, *see* [MANN, B: Pickman, *ed.*] Bibliographical record [Rec., 3050].

Bowles, G: H., *secretary*, *see* ENTOMOLOGICAL society of Ontario: *Montreal branch* [Rec., 3030].

[**Brooklyn** entomological society.] For sale. (Psyche, May [9 July] 1880, v. 3, p. 72, 3 cm.)

Advertisement of J: L. Leconte's "Synopsis of the N. A. species of *platynus*" . . . for sale. *B: P. M.* (2942)

Burgess, E: Recent studies in insect anatomy. Third annual address of the president. (Psyche, Mar. [1 May] 1880. v. 3, p. 27-43, 568 cm.)

Notice. (Amer. entom., June 1880, v. 3, n. s., v. 1, p. 147, 3 cm.)

Address delivered 9 Jan. 1880, as retiring president of the Cambridge entomological club, giving a review of the works relating to insect anatomy and physiology, published during 1878 and 1879. *G: D.* (2943)

[**Cambridge** entomological club.] Acknowledgments. (Psyche, 1880. v. 3: [22] Jan., p. 2, 4 cm.; Feb. [6 Mch.], p. 14, 3 cm.)

Acknowledgments of receipts of contributions to permanent publication fund of *Psyche*. *G: D.* (2944)

Cambridge entomological club. (Psyche, Feb. [6 Mch.] 1880, v. 3, p. 20, 18 cm.)

Minutes of annual and monthly meeting of Cambridge entomological club, 9 Jan. 1880, by the secretary (B: P. Mann); annual reports for 1879; election of officers for 1880. *B: P. M.* (2945)

Cambridge entomological club. (Psyche, June [13 Aug.] 1880, v. 3, p. 77, 27 cm.)

Minutes of monthly meetings of Cambridge entomological club, Feb.-June 1880, by the secretary (B: P. Mann); abstract of communications made. *B: P. M.* (2946)

Cambridge entomological club. (Psyche, Dec. 1880 [13 May 1881], v. 3, p. 150, 6 cm.)

Minutes of monthly meeting of Cambridge entomological club, 8 Oct. 1880, by the secretary (B: P. Mann); occurrence of an undetermined household pest near Boston (by H. A. Hagen). *B: P. M.* (2947)

Cambridge entomological club. (Psyche, Jan. [27 June] 1881, v. 3, p. 162, 26 cm.)

Minutes of monthly meeting of Cambridge entomological club, 12 Nov. 1880, [by the secretary (B: P. Mann)]; election of members; abstract of communications made. *B: P. M.* (2948)

Cambridge entomological club. (Psyche, Mch. [25 July] 1881, v. 3, p. 186, 16 cm.)

Minutes of monthly meeting of Cambridge entomological club, 10 Dec. 1880 [by the secretary (B: P. Mann)]; abstract of communications made. *B: P. M.* (2949)

Cambridge entomological club. (Psyche. Jul.-Sep. 1881 [7 Mch. 1882], v. 3, p. 245, 22 cm.)

Minutes of annual and monthly meeting of Cambridge entomological club, 14 Jan. 1881, and in part of monthly meeting, 11 Feb. 1881 [by the secretary (B: P. Mann)]; annual reports for 1880; election of officers for 1881; election of members; notice of death of E. C: Prentiss. *B: P. M.* (2950)

Cambridge entomological club. (Psyche, Oct.-Dec. 1881 [7 Apr. 1882], v. 3, p. 277-279, 86 cm.)

Minutes of monthly meetings of Cambridge entomological club, Feb.-May and Oct.-Dec. 1881, by the secretaries (B: P. Mann and W: Trelease); abstract of communications made; election of W: Trelease as secretary. *B: P. M.* (2951)

Cambridge entomological club. (Psyche, Mch.-Apr. [24 June] 1882, v. 3, p. 328, 24 cm.)

Minutes of monthly meeting of Cambridge entomological club, 9 Dec. 1881 (concluded), and of annual and monthly meeting, 13 Jan. 1882 [by the secretary (W. Trelease)]; abstract of communications made; election of officers for 1882; thanks voted to B: P. Mann for services as secretary and treasurer. *B: P. M.* (2952)

Cambridge entomological club. (Psyche, July [16 Dec.] 1882, v. 3, p. 369, 17 cm.)

Minutes of monthly meetings of Cambridge entomological club, 10 Feb. and 10 Mch. 1882 [by the secretary (W: Trelease)]; abstract of communications made; A. P. Chadbourne elected a member; constitution and by-laws amended. *B: P. M.* (2953)

Cambridge entomological club. (Psyche, Sept.-Oct. 1882 [1 Mch. 1884], v. 3, p. 402, 14 cm.)

Minutes of monthly meeting of Cambridge entomological club, 14 Apr. 1882 [by the secretary *pro tem.* (R. Hayward)]; abstract of communications made. *B: P. M.* (2954)

Cambridge entomological club. (Psyche, Nov.-Dec. 1882 [—1885], v. 3, p. 414-417, 210 cm.)

Minutes of monthly meetings of Cambridge entomological club, May and Oct.-Dec. 1882 [by the secretary *pro tem.* for May (W: Barnes) and the secretary (G: Dimmock)]; abstract of communications made. *B: P. M* (2955)

Chambers, Vactor Tousey. Further notes on some tineid larvae. (Psyche, Nov. 1880 [22 Mar. 1881], v. 3, p. 135-137, 98 cm.; Dec. 1880 [13 May 1881], v. 3, p. 147-149, 96 cm.)

Extract, with notice, by S: Lockwood, entitled, "Mussel and insect climbers." (Amer. nat., Sept. [23 Aug.] 1881, v. 15, p. 737.)

Notes on the life-history of species belonging to the genera *phyllocnistis*, *nepticula*, *aspidisca* and *antispila*. *G: D.* (2956)

Chambers, Vactor Tousey. *Nepticula pteliaeella*, n. sp. (Psyche, Oct.-Dec. 1881 [7 Apr. 1882], v. 3, p. 276, 23 cm.)

Describes *nepticula pteliaeella* n. sp., of which the larval history was given in author's "Further notes on some tineid larvae" (Psyche, Nov.-Dec. 1880, v. 3, p. 137, 147) [Rec., 2956]. *G: D.* (2957)

Chambers, Vactor Tousey. Notes upon some tineid larvae. (Psyche, May [9 July] 1880, v. 3, p. 63-68, 177 cm., fig.)

Descriptions of the life-history of several species of *tineidae*. *G: D.* (2958)

Claypole, E: Waller. On a larva boring the leaf-stalks of the buckeye, *aesculus glabra*, in Ohio. (Psyche, July [16 Dec.] 1882, v. 3, p. 364-367, 110 cm.)

Life-history of *steganoptycha claypoleana* and comparison of its habits with those of *proteoteras aesculanum*. *G: D.* (2959)

Comstock, J: H: *Coccidae* wanted. (Psyche, 1880-1882, v. 3, p. 120, 132, 144, 156, 168, 180, 192, 204, 216, 228, 260, 292, 304, 316, 336, 348, 350, 362, 374, 386, *each* 4 cm.)

Advertisement. *B: P. M.* (2960)

Cook, Albert J: Foreign honey bees. (Psyche, Apr. [18 Aug.] 1881, v. 3, p. 197-198, 56 cm.)

Notes on honey-bees of Cyprus, Syria, Ceylon, and Java. *G: D.* (2961)

Cook, Albert J: Insects in winter. (Psyche, March [25 July] 1881, v. 3, p. 183-185, 103 cm.)

Discussion of hibernation in insects, and especially of the physiological condition of honey-bees (*apis mellifica*) in winter. *G: D.* (2962)

Corrections. (Psyche, Dec. 1880 [13 May 1881], v. 3, p. 155, 35 cm.)

Corrections of errors detected in *Psyche* for Jan.-Nov. 1880, v. 3, p. 1-144. *B: P. M.* (2963)

Dimmock, Anna Katherina [Hofmann], *wife of* G: Asymmetry of the nervous system in the larva of *harpyia*. (Psyche, May [19 Aug.] 1882, v. 3, p. 340-341, 51 cm., fig. 6.)

Notice, by Paul Mayer. (Zool. Jahresber. f. 1882, 1883, abtheil. 2, p. 145.)

Abstr. (Journ. Roy. micros. soc., Feb. 1883, s. 2, v. 3, p. 46-47.)

Shows that the commissures connecting the first and second thoracic ganglia of *harpyia vinula* are partly united, and turn to the left to avoid the duct of a gland; figures these parts. *B: P. M.* (2964)

Dimmock, G: Alphabetic index to Psyche, vol. 3. (Psyche, Nov.-Dec. 1882 [——1885], v. 3, p. - .) [not seen.]

Alphabetic index to names of genera and species contained in volume 3 of *Psyche*. *B: P. M.* (2965)

Dimmock, G: Anatomy of the mouth parts and of the suctorial apparatus of *culex*. (Psyche, July-Sept. 1881 [7 March 1882], v. 3, p. 231-241, 347 cm., pl. 1, *with* [*1 p.*] *expl. of pl.*)

Rev., by J: T. C[arrington], entitled "Entomological anatomy." (Entomologist, April 1882, v. 15, p. 96.)

Brief history of the subject; descriptions and figures of the mouth-parts, fulcrum and oesophageal sucking apparatus of *culex;* how *culex* bites. Extracted, with additions and changes, from author's "The anatomy of the mouth-parts and of the sucking apparatus of some diptera. Dissertation" . . . 1881. *B: P. M.* (2966)

Dimmock, G: Announcement. (Psyche, [22] Jan. 1880, v. 3, p. 7, 2 cm.)

Announces the proposed publication, in the Bibliographical record [Rec., 3050], of a list of notices of entomologists who died during 1879. *B: P. M.* (2967)

Dimmock, G: Book notice. (Psyche, June [13 Oct.] 1882, v. 3, p. 354, 4 cm.)

Notice of the reprint of S: H. Scudder's "Fragments of the coarser anatomy of diurnal lepidoptera" . . . [Rec., 3086]. *B: P. M.* (2968)

Dimmock, G: Book notice. (Psyche, Aug. 1882 [15 Jan. 1883], v. 3, p. 381, 9 cm.)

Notice of W. H. Müller's "Proterandrie der Bienen" [Rec., 2891]. *B: P. M.* (2969)

Dimmock, G: Circulation of blood in the larva of *hydrophilus.* (Psyche, Mar.-Apr. [24 June] 1882, v. 3, p. 324-326, 84 cm., fig. 5.)

Notice, by Paul Mayer. (Zool. Jahresber. f. 1882, 1883, abtheil. 2, p. 136.)

Describes and indicates on a figure the direction of the blood-currents in the head, antennae and trophi of *hydrophilus.* *B: P. M.* (2970)

Dimmock, G: The cocoons of *cionus scrophulariae.* (Psyche, Nov.-Dec. 1882 [—1885], v. 3, p. 411-412, 80 cm.)

Notes on the structure of the cocoon of *cionus scrophulariae.* *B: P. M.* (2971)

Dimmock, G: Defensive mimicry in *phalangidae.* (Psyche, Jan. [29 Apr.] 1882, v. 3, p. 299, 34 cm.)

A species of *phalangidae* imitates a spider's web with a spider in it. *B: P. M.* (2972)

Dimmock, G: Editorial. (Psyche, June [13 Oct.] 1882, v. 3, p. 354, 23 cm.)

Explanation of circumstances attending the editing and publication of *Psyche,* v. 3, up to the present time; acknowledgments of cooperation, especially of E. C: Prentiss and B: P. Mann, in these labors; statement of relative contents of this volume compared with the previous ones; urges the increase of the publication fund. *B: P. M.* (2973)

Dimmock G: Editorial notice. (Psyche, Nov.-Dec. 1882 [——1885], v. 3, p. 414, 15 cm.)

Notice of the contents of volume three of *Psyche,* and the change in price of that volume when it is completed. *G: D.* (2974)

Dimmock, G: On a habit of *scolopendra morsitans.* (Psyche, Aug. 1882 [15 Jan. 1883], v. 3, p. 380, 23 cm.)

Describes the manner in which *scolopendra morsitans* works with its mouth-parts upon wounds made upon its body. *B: P. M.* (2975)

Dimmock G: Introductory. (Psyche, [22] Jan. 1880, v. 3, p. 7, 25 cm.)

Prospectus of volume 3 of *Psyche;* solicitation of cooperation. *B: P. M.* (2976)

Dimmock, G: Note on *catogenus rufus.* (Psyche, May [19 Aug.] 1882, v. 3, p. 341-342, 30 cm., fig. 7.)

The larva of *catogenus rufus* found to devour the pupa of *elaphidion parallelum;* figure of pupa of *c. rufus.* *B: P. M.* (2977)

Dimmock, G: Notes on *pterophoridae.* (Psyche, Sep.-Oct. 1882 [1 Mar. 1884], v. 3, p. 402-404, 82 cm.)

Citation of original and prominent subsequent descriptions of larvae of *pterophoridae* of North America, with references to published figures of different stages, to notices of food-plants of larvae, to localties of capture, and to observations made by the author. *B: P. M.* (2978)

Dimmock, G: Notes on *pterophoridae* of North America. 2. (Psyche, Nov.-Dec. 1882 [——1885], v. 3, p. 413, 18 cm.)

Continuation of author's "Notes on *pterophoridae*" (*op. cit.,* Sep.-Oct. 1882 [1 Mar. 1884], p. 402-404.) [Rec., 2978]. *G: D.* (2979)

Dimmock, G: Notice. (Psyche, [22] Jan. 1880, v. 3, p. 12, 13 cm.)

Prospectus of volume 3 of *Psyche*; solicitation of cooperation. *B: P. M.* (2980)

Dimmock, G: Organs, probably defensive in function, in the larva of *hyperchiria varia,* Walk. : *saturnia io,* Harris. (Psyche, June [13 Oct.] 1882, v. 3, p. 352-353, 50 cm.)

Notice, by Paul Mayer. (Zool. Jahresber. f. 1882, 1883, abtheil. 2, p. 145.)

Description of an evaginable organ upon each side of the fourth and tenth segments posterior to the head of the larva of *hyperchiria varia.* *B: P. M.* (2981)

Dimmock, G: Review. (Psyche, Dec. 1880 [13 May 1881], v. 3, p. 150, 11 cm.)

Review of S. Mocquerys' "Tératologie entomologique" . . . [Rec., 2037]. *B: P. M.* (2982)

Dimmock, G: Reviews. (Psyche, Feb. [6 Mar.] 1880, v. 3, p. 19, 13 cm.)

Rev. of papers by E. Brandt [Rec., 1451-1458] on the nervous system of insects. *B: P. M.* (2983)

Dimmock, G: Reviews. (Psyche, April [28 May] 1880, v. 3, p. 54, 15 cm.)

Abstract. (Amer. entom., Aug. 1880, v. 3, n. s., v. 1, p. 198, 6 cm.)

Review of F. Katter's "Index entomologicus, Pars 1" [Rec., 1610] and of B. Gerhard's "Systematisches Verzeichniss der Macro-lepidopteren von Nord-Amerika" [Rec., 1594]. *B: P. M.* (2984)

Dimmock, G: On some glands which open externally on insects. (Psyche, Sep.-Oct. 1882 [1 March 1884] v. 3, p. 387-401, 493 cm.)

Rev. entitled, "The closed poison glands of caterpillars." (Amer. nat., May [19 Apr.] 1884, v. 18, p. 535.)—Same rev. [with slight typographical changes], entitled, "Poison glands in the skin of the cecropia caterpillar." (*op. cit.*, Oct. [15 Sept.] 1884, v. 18, p. 1046-1047.)

Notice. (Amer. nat., June [17 May] 1884, v. 18, p. 634.)

Notice. (Amer. nat., July [17 June] 1884, v. 18, p. 729.)

Reviews, by G: Balding and J. Anderson, *jr.*, entitled, "Urticating properties of lepidoptera." (Entomologist, Feb. 1885, v. 18, p. 41-45.)

Compiled and original descriptions of the structure and functions of the several classes of glands which open externally in insects; bibliographical list of 82 titles of articles on this subject. *B: P. M.* (2985)

Dimmock, G: Systematic index to Psyche, vol. 3. (Psyche, Nov.-Dec. 1882 [—— 1885], v. 3, p. 431- .) [not seen.]

Index to contents of volume 3 of *Psyche*, arranged systematically, and with classificational subdivisions numerated according to the Dui decimal system, as developed by B: P. Mann. *G: D.* (2986)

Dimmock, G: Title slips. (Psyche, Mar. [1 May] 1880, v. 3, p. 44, 28 cm.)

Discussion and history of the title-slip form of bibliographical record, with directions for using the title-slips. *B: P. M.* (2987)

Dimmock, G: The trophi and their chitious supports in *gracilaria*. (Psyche, Aug. [4 Nov.] 1880, v. 3, p. 99-103, 161 cm., fig. 2-4.)

Notice, by Paul Mayer. (Zool. jahresber. f. 1882, 1883, abtheil. 2, p. 146.)

Describes and figures the mouth-parts and their chitinous supports in *gracilaria syringella*. *B: P. M.* (2988)

Dimmock, G:, *secretary*, *see* CAMBRIDGE entomological club [Rec., 2955].

Dimmock, G: Monroe. Dimmock's special bibliographies. (Psyche, 1881-1882, v. 3, p. 260, 292, 304, 316, 336, 348, *each* 6 cm.)

Advertisement of Dimmock's special bibliographies, nos. 1-3, for sale. *B: P. M.* (2989)

Dose, A. Entomologische Nachrichten, 6. jahrg. 1880. (Psyche, 1880-1882, v. 3, p. 12, 24, 48, 60, 72, 84, 96, 108, 120, 132, 144, 156, 168, 180, 192, 204, *each* 8 cm.)

Advertisement of *Entomologische Nachrichten* for subscription, by publisher, with commendatory notice of this magazine, by E. von Harold. *B: P. M.* (2990)

Dwight, W: Buck. The domestication of *papilio thoas* [*cresphontes*] in Dutchess county, N. Y. (Psyche, Mar.-Apr. [24 June] 1882, v. 3, p. 327, 34 cm.)

Larvae of *papilio thoas* found feeding on *dictamnus fraxinella* and *zanthoxylum americanum* about Poughkeepsie, N. Y. *G: D.* (2991)

Edwards, H: Papilio. (Psyche, 1881-1882, v. 3, p. 216, 228, 260, 292, 304, 316, 336, 348, *each* 3 cm.)

Advertisement of *Papilio* for subscription. *B: P. M.* (2992)

Edwards, W: H: *and* **Wilson**, Joseph Martin. Chemical change of coloration in butterflies' wings. (Psyche, July [12 Oct.] 1880, v. 3, p. 87-88, 32 cm.)

Abstract, [by C: V. Riley], entitled, "Chemical change in the color of butterfly-wings." (Amer. entom., Dec. 1880, v. 3, n. s., v. 1, p. 294, 5 cm.)

Discusses change of color produced by carbolic acid in wings of *limenitis arthemis*. *G: D.* (2993)

Edwards, W: H: Description of the preparatory stages of *apatura alicia*. (Psyche, Oct. 1880 [12 Feb. 1881], v. 3, p. 123-127, 138 cm.)

Crit. rev., [by C: V. Riley], entitled "Specific value of *apatura alicia*." (Amer. nat., June [19 May] 1881, v. 15) (RILEY, C: V. Entomology...[June 1881]), p. 487.

Describes egg, stages of larva, and chrysalis of *apatura alicia;* decides that *a. alicia* is distinct from *a. celtis*. *G: D.* (2994)

Edwards, W: H: Effect of cold applied to chrysalids of *limenitis disippus*. (Psyche, Jan. [27 June] 1881, v. 3, p. 174, 20 cm.)

Changes of color produced in imago of *limenitis disippus* by exposing its chrysalids to cold. *G: D.* (2995)

Edwards, W: H: Experiments upon the effect of cold applied to chrysalids of butterflies. (Psyche, 1880, v. 3: [22] Jan., p. 3-6, 129 cm.; Feb. [6 Mch.], p. 15-19, 149 cm.; June [13 Aug.], p. 75-76, 39 cm.)

Notice and extract in [C: V. Riley's] "Effects of cold applied to the chrysalides of butterflies" (Amer. entom., May 1880, v. 3, n. s., v. 1, p. 110-111, 33 cm.)

Abstract of [Riley's] notice, etc., entitled "Ueber die Wirkung der Kälte auf Schmetterlingspuppen." (Entom. Nachrichten, 1 July 1880, jahrg. 6, p. 144.)

Experiments upon the change in coloration of butterflies which could be brought about by keeping their chrysalids in the cold. *G: D.* (2996)

Edwards, W: H: On the number of molts of butterflies, with some history of the moth] *callosamia promethea.* (Psyche, 1881, v. 3: Jan. [27 June], p. 159-161, 95 cm.; Feb. [14 July], p. 171-174, 107 cm.)

Discussion of the number of molts and its inconstancy in lepidoptera. *G: D.* (2997)

Entomological club of the American association for the advancement of science. (Psyche, Sept. [15 Dec.] 1880, v. 3, p. 114, 27 cm.)

Partial report of meetings of Entomological club of A. A. A. S., held at Boston, Mass., 25 and 30 Aug. 1880, consisting of a letter from W: H: Edwards concerning biological observations on lepidoptera, with remarks by A: R. Grote, and a letter from Cyrus Thomas concerning migrations of *caloptenus spretus.* *G: D.* (2998)

Entomological items. (Psyche, [22] Jan. 1880, v. 3, p. 11, 7 cm.) *G: D.* (2999)

Entomological items. (Psyche, Feb. [6 Mch.] 1880, v. 3, p. 23, 17 cm.) *G: D.* (3000)

Entomological items. (Psyche, Mch. [1 May] 1880, v. 3, p. 47, 17 cm.) *G: D.* (3001)

Entomological items. (Psyche, Apr. [28 May] 1880, v. 3, p. 59, 17 cm.) *G: D.* (3002)

Entomological items. (Psyche, May [9 July] 1880, v. 3, p. 71, 17 cm.) *G: D.* (3003)

Entomological items. (Psyche, June [13 Aug.] 1880, v. 3, p. 83, 17 cm.) *G: D.* (3004)

Entomological items. (Psyche, July [12 Oct.] 1880, v. 3, p. 95, 17 cm.) *G: D.* (3005)

Entomological items. (Psyche, Aug. [4 Nov.] 1880, v. 3, p. 107, 17 cm.) *G: D.* (3006)

Entomological items. (Psyche, Sep. [15 Dec.] 1880, v. 3, p. 119, 17 cm.) *G: D.* (3007)

Entomological items. (Psyche, Oct. 1880 [12 Feb. 1881], v. 3, p. 131, 17 cm.) *G: D.* (3008)

Entomological items. (Psyche, Nov. 1880 [22 Mch. 1881], v. 3, p. 143, 17 cm.) *G: D.* (3009)

Entomological items. (Psyche, Jan. [27 June] 1881, v. 3, p. 167, 17 cm.) *G: D.* (3010)

Entomological items. (Psyche, Feb. [14 July] 1881, v. 3, p. 179, 16 cm.) *G: D.* (3011)

Entomological items. (Psyche, Mch. [25 July] 1881, v. 3, p. 191, 17 cm.) *G: D.* (3012)

Entomological items. (Psyche, Apr. [18 Aug.] 1881, v. 3, p. 203, 17 cm.) *G: D.* (3013)

Entomological items. (Psyche, May [4 Nov.] 1881, v. 3, p. 215, 17 cm.) *G: D.* (3014)

Entomological items. (Psyche, June [18 Nov.] 1881, v. 3, p. 227, 17 cm.) *G: D.* (3015)

Entomological items. (Psyche, Jul.-Sep. 1881 [7 Mch. 1882], v. 3, p. 259, 17 cm.) *G: D.* (3016)

Entomological items. (Psyche, Oct.-Dec. 1881 [7 Apr. 1882], v. 3, p. 290-291, 51 cm.)

Includes C: R. Osten Sacken's "Habits of *bombylius*" [Rec., 3077]. *G: D.* (3017)

Entomological items. (Psyche, Jan. [29 Apr.] 1882, v. 3, p. 303, 17 cm.) *G: D.* (3018)

Entomological items. (Psyche, Feb. [24 May] 1882, v. 3, p. 315, 17 cm.) *G: D.* (3019)

Entomological items. (Psyche, Mch.-Apr. [24 June] 1882, v. 3, p. 335, 17 cm.) *G: D.* (3020)

Entomological items. (Psyche, May [19 Aug.] 1882, v. 3, p. 347, 17 cm.) *G: D.* (3021)

Entomological items. (Psyche, June [13 Oct.] 1882, v. 3, p. 359-360, 47 cm.) *G: D.* (3022)

Entomological items. (Psyche, July [16 Dec.] 1882, v. 3, p. 371-372, 46 cm.) *G: D.* (3023)

Entomological items. (Psyche, Aug. 1882 [15 Jan. 1883], v. 3, p. 383-384, 45 cm.) *G: D.* (3024)

Entomological items. (Psyche, Sep.-Oct. 1882 [1 Mar. 1884], v. 3, p. 407-408, 60 cm.)

Includes [C: V. Riley's] "A new museum pest" [Rec., 3083], and J: J. Wier's "Danaine butterflies not subject to the attack of mites" [Rec., 3099]. *G: D.* (3025)

Entomological section of the Academy of natural sciences, Philadelphia, Pa. (Psyche, 1880, v. 3: July [12 Oct.], p. 89, 24 cm.; Aug. [4 Nov.], p. 104, 28 cm.)

Minutes of monthly meetings of Entomological section of Academy of natural sciences of Philadelphia, for 1879, made in abstract from "Proceedings of the monthly meetings"... of that section; abstract of communications made; list of officers for 1880. *B: P. M.* (3026)

Entomological section of the Boston society of natural history. (Psyche, April [28 May] 1880, v. 3, p. 54, 12 cm.)

Minutes of monthly meetings of Entomological section of Boston society of natural history, Jan.-Mch. 1880, by the secretary (B: P. Mann); abstract of communications made. *B: P. M.* (3027)

Entomological society of London. (Psyche, Feb. [6 Mch.] 1880, v. 3, p. 20, 10 cm.)

Partial abstract of communications made at meeting of Entomological society of London, 3 Dec. 1879, extracted from *Athenaeum*, 27 Dec. 1879, p. 853. *B: P. M.* (3028)

Entomological society of London. (Psyche, Oct.-Dec. 1881 [7 Apr. 1882], v. 3, p. 279, 11 cm.)

Partial abstract of communications made at meetings of Entomological society of London, 2 June and 6 Oct. 1880 and 2 Mch. 1881. *G: D.* (3029)

Entomological society of Ontario—*Montreal branch*. (Psyche, May [9 July] 1880, v. 3, p. 69, 14 cm.)

Minutes of 7th annual meeting of Montreal branch of Entomological society of Ontario, 17 May 1880, by the secretary (G: H. Bowles); list of officers elected for the ensuing year, and of papers read during the past year; abstract of annual reports. *B: P. M.* (3030)

Fernald, C: H: Notes on *phoxopteris angulifasciana* Zell. Psyche, July [12 Oct.] 1880, v. 3, p. 88, 27 cm.)

Notice, [by C: V. Riley], entitled "Oviposition in the *tortricidae*." (Amer. entom., Nov. 1880, v. 3, n. s., v. 1, p. 276, 8 cm.)

Description of eggs and oviposition of *phoxopteris angulifasciana;* color and habits of larvae. *G: D.* (3031)

Fernald, C: H: Review. (Psyche, Oct. 1880 [12 Feb. 1881], v. 3, p. 128, 25 cm.)

Review of T: De Grey's [*Lord Walsingham*] "Illustrations of typical specimens of... N. A. *tortricidae*" [Rec., 1943]. *G: D.* (3032)

Fernald, C: H: *Tortricidae* wanted. (Psyche, 1880-1882, v. 3, p. 12, 24, 48, 60, 72, 84, 96, 108, 120, 132, 144, 156, 168, 180, 192, 204, 216, 228, 260, 292, 304, 316, 336, 348, 350, 362, 374, 386, *each* 3 cm.)

Advertisement for specimens of North American *tortricidae* to be used in the study of this family. *B: P. M.* (3033)

Gallagher, W. C. For sale. (Psyche, 1880, v. 3, p. 84, 96, *each* 2 cm.)

Advertisement of lepidoptera for sale. *B: P. M.* (3034)

Goodell, Lafayette Washington. Notes on *sphingidae*. (Psyche, July [16 Dec.] 1882, v. 3, p. 367-368, 30 cm.)

Dates of capture and relative abundance of different species of *sphingidae*, at Amherst, Mass. *G: D.* (3035)

Hagen, Hermann August. On an aquatic sphinx larva. (Psyche, Sept. [15 Dec.] 1880, v. 3, p. 113, 20 cm.) [Rec., 2502.]

Notice. (Zool. Jahresber. f. 1880, 1881, abtheil. 2, p. 293.) *G: D.* (3036)

Hagen, Hermann August. Some *psocina* of the United States. (Psyche, 1881, v. 3: Apr. [18 Aug.], p. 195-196, 64 cm.; May [4 Nov.], p. 207-210, 131 cm.; June [18 Nov.], p. 219-223, 168 cm.: Oct.-Dec. 1881 [7 Apr. 1882], v. 3, p. 291, 5 cm.)

Notice, [by C: V. Riley], entitled "Structure of the claw in *psocina*." (Amer. nat., [3] Dec. 1881, v. 15) (Riley, C: V. Entomology... [Dec. 1881]), p. 1013-1014.

Abstract, by H. A. Hagen. [Zool. Jahresber. f. 1881, 1882, abtheil. 2, p. 142-143.)

General notes upon the synonymy and anatomy of species of *psocus, caecilius, atropos, amphientomum, elipsocus, mesopsocus, peripsocus, epipsocus, perientomum, syllisis, calopsocus, amphigerontia* and *lachesilla*. *G: D.* (3037)

Hagen, Hermann August. The yellow fever fly. [Psyche, Sept. [15 Dec.] 1880, v. 3, p. 111, 28 cm.)

Crit. rev., by C: V. Riley, entitled "The 'yellow fever fly.'" (Amer. nat., Feb. [25 Jan.] 1881, v. 15) (Riley, C: V. Entomology... [Feb. 1881]), p. 150.

On a fly, probably a species of *sciara*, once supposed to swarm when yellow fever was epidemic. *G: D.* (3038)

Hayward, Roland, *secretary pro tem.*, *see* Cambridge entomological club [Rec. 2954].

Howard, Leland Ossian. Alternate generation in *cynipidae*. (Psyche, Mar.-Apr. [24 June] 1882, v. 3, p. 328-329, 38 cm.)

Rev. of Jules Lichtenstein's "La génération alternante chez les cynipides, par le Dr. H. Adler"... [Rec., 2683]. *G: D.* (3039)

King, Helen Selina, *wife of* Valentine Overton. Internal organization of *hesperia ethlius* Cram., as observed in the living animal. (Psyche, Mar.-Apr. [24 June] 1882, v. 3, p. 322-324, 87 cm.)

Description of the somewhat diaphanous larva of *hesperia ethlius*, and of its internal organs as seen through the skin. *G: D.* (3040)

King, Helen Selina, *wife of* Valentine Overton. Life history of *pleotomus pallens* Lec. (Psyche, April [28 May] 1880, v. 3, p. 51-53, 74 cm.)

Biological notes upon *pleotomus pallens*.
G: D. (3041)

King, Helen Selina, *wife of* Valentine Overton. *Thyridopteryx ephemeraeformis* Haworth. Its habits and metamorphosis. (Psyche, July-Sept. 1881 [7 Mar. 1882], v. 3, p. 241-243, 87 cm.)

Biological notes upon *thyridopteryx ephemeraeformis*. *G: D.* (3042)

Krancher, Oskar Paul. Contribution to the knowledge of sonifaction in insects. (Psyche, July [16 Dec.] 1882, v. 3, p. 363-364, 44 cm.)

Mode of sonifaction of larva of *saturnia pyri*; a larva of *stauropus fagi* which had lost a fore leg produced an imago in which the corresponding fore leg was absent; a female *lasiocampa quercifolia* deposited 580 fertile eggs in two days. *G: D.* (3043)

Krancher, Oskar [Paul]. Lepidoptera and coleoptera. (Psyche, Sep.-Oct. 1882 [1 Mar. 1884], v. 3, p. 408, 3 cm.)

Advertisement of inflated larvae and of lepidoptera and coleoptera of Europe for sale. *B: P. M.* (3044)

Laurent, Philip. Coleoptera and lepidoptera. (Psyche, Feb. [14 July] 1881, v. 3, p. 179, 1 cm.)

Advertisement of coleoptera and lepidoptera for sale and exchange. *B: P. M.* (3045)

Linnean society of London. (Psyche, May [9 July] 1880, v. 3, p. 69, 14 cm.)

Partial abstract of communications made at meetings of Linnean society of London, 5 Feb. 1880 (from *Athenaeum*, 14 Feb. 1880, p. 220) and 19 Feb. 1880 (from *Zool. Anzeiger*, 22 Mch. 1880, jahrg. 3, p. 143-144, by J. Murie); structure of organs in larva of *tanypus maculatus* formerly considered respiratory (by A. Hammond); habits of *pheidole javana* and another ant in mining living plants (by James Britten and M. Musters). *B: P. M.* (3046)

Linnean society of London. (Psyche, Dec. 1880 [13 May 1881], v. 3, p. 150, 12 cm.)

Partial abstract of communications made at meeting of Linnean society of London, 17 June 1880 (from *Zool. Anzeiger*, 23 Aug. 1880, jahrg. 3, p. 431-432, by J. Murie); notes on the structure of maxillary glands and stridulating organs of *araneina* (by F. M. Campbell); reference to observations on the powers of communication in hymenoptera (by J: Lubbock).
B: P. M. (3047)

Linnean society of London. (Psyche, June [18 Nov.] 1881, v. 3, p. 224, 22 cm.)

Partial abstract of communications made at meeting of Linnean society of London, 3 Feb. 1881 (from *Zool. Anzeiger*, 28 Mch. 1881, jahrg. 4, p. 167-168); observations on the life history of *gamasinae* (by A. D. Michael). *B: P. M.* (3048)

Macloskie, G: Pneumatic functions of insects. (Psyche, Aug. 1882 [15 Jan. 1883], v. 3, p. 375-378, 109 cm.)

Describes how air pressed into organs of insects aids in their functions, illustrated in the protrusion of the proboscis of *libellula* and *musca*, in the respiration of *libellula*, *psephenus* and *musca*, and in the formation of organs when some insects emerge from the pupal skin. *G: D.* (3049)

Mann, B: Pickman, *secretary*, *see* CAMBRIDGE entomological club [Rec. 2945-2951].

Mann, B: Pickman, *secretary*, *see* ENTOMOLOGICAL section of the Boston society of natural history [Rec., 3027].

Mann, B: Pickman, *see* MEETING (52nd) of German naturalists and physicians in Baden-Baden [Rec., 3065].

[**Mann**, B: Pickman, *ed.*] Bibliographical record. (Psyche, 1880-1882, v. 3, p. 8-10, 21-22, 45-46, 55-58, 70, 78-82, 90-94, 105-106, 115-118, 129-130, 139-142, 151-154, 163-166, 176-178, 187-190, 200-202, 212-214, 225-226, 248-258, 280-289, 301-302, 313-314, 330-334, 344-346, 355-358, 370, 382, 405-406, 000-000.)

List of publications on entomology, being no. 1447-3100 of the Bibliographical record of *Psyche*, containing exact titles of and references to and brief analyses of each publication recorded, with occasional explanations of the method of record.
B: P. M. (3050)

Mann, B: Pickman. Blank insect labels. (Psyche, 1880-1882, v. 3, p. 12, 24, 48, 60, 72, 84, 96, 108, 120, 132, *each* 4 cm., 2 fig.)

Advertisement. *B: P. M.* (3051)

Mann, B: Pickman. Cluster-flies. (Psyche, Aug. 1882 [15 Jan. 1883], v. 3, p. 378-379, 33 cm.)

Abundance of *pollenia rudis* and *microdon globosus* hibernating sometimes in houses. *G: D.* (3052)

Mann, B: Pickman. Entomologists' materials for sale. (Psyche, 1880-1882, v. 3: p. 2, 14, 26, 50, 62, 74, 86, 98, 110, 122, *each* 10 cm.; p. 134, 146, 158, *each* 8 cm.; p. 170, 182, 194, 206, 218, 230, 262, *each* 6 cm.; p. 294, 306, 318, 338, *each* 5 cm.)

Advertisement, occasionally changed, of insect pins, boxes, cork, glass tubes, rubber stoppers, labels and entomological photographs for sale.
B: P. M. (3053)

Mann, B: Pickman. George Dole Smith. (Psyche, Apr. [18 Aug.] 1881, v. 3, p. 199, 30 cm.)

Biographical notice of G: Dole Smith, abstracted from a memoir by J: Orne, jr. [*See* Rec., 2164, 2555.]
G: D. (3054)

Mann, B: Pickman. In memoriam. (Psyche, Oct. 1880 [12 Feb. 1881], v. 3, p. 128, 4 cm.)

Notice of death of Edwin C: Prentiss. *G: D.* (3055)

Mann, B: Pickman. Joseph Duncan Putnam. (Psyche, Feb. [24 May] 1882, v. 3, p. 312, 27 cm.)

Biographical sketch of J. D. Putnam. [*See* Rec., 2006.] *G: D.* (3056)

Mann, B: Pickman. Loan libraries. (Psyche, Jan. [29 Apr.] 1882, v. 3, p. 300, 27 cm.)

General remarks upon the value of loan libraries, and upon requisites to the success of such libraries, with especial mention of the library of the Cambridge entomological club. *G: D.* (3057)

Mann, B: Pickman. Mann's catalogue of plants. (Psyche, 1880-1882, v. 3, p. 144, 156, 168, 180, 192, 204, 216, 228, 260, 292, 304, 316, 336, 348, *each* 5 cm.)

Advertisement for sale of Horace Mann, jr's "Catalogue of the phaenogamous plants of the United States, east of the Mississippi, and of the vascular cryptogamous plants of North America north of Mexico. 2d ed." *B: P. M.* (3058)

Mann, B: Pickman. Promoting locust ravages. (Psyche, Aug. 1882 15 [Jan. 1883], v. 3, p. 379-380, 34 cm.)

Quotes, with introductory remarks, a letter by J: P. Brown, in which the enormous prevalence of *caloptenus spretus* in Kansas, in 1875, is explained, in part at least, by the destruction of great numbers of game birds. *G: D.* (3059)

Mann, B: Pickman. Readers and writers economy co. (Psyche, 1880, v. 3, p. 108, 120, 132, *each* 3 cm.)

Advertisement. *B: P. M.* (3060)

Mann, B: Pickman. Records of necrology. (Psyche, Jan. [27 June] 1881, v. 3, p. 175, 4 cm.)

Brief notice of the publication of records of necrology in the Bibliographical record of *Psyche*, with request for contributions to these records. *G: D.* (3061)

Mann, B: Pickman. Review. (Psyche, July [12 Oct.] 1880, v. 3, p. 89, 4 cm.)

Review of J. P. Ballard's "Insect lives"... [Rec. 1725]. *G: D.* (3062)

Mann, B: Pickman. Review. (Psyche, Nov. 1880 [22 Mar. 1881], v. 3, p. 138, 6 cm.)

Review of S. H. Peabody's "Cecil's books of natural history"... [Rec., 1982]. *G: D.* (3063)

Mann, B: Pickman. *Xylocopa* perforating a corolla-tube. (Psyche, Jan. [29 Apr.] 1882, v. 3, p. 298, 10 cm.)

Description of the manner in which a species of *xylocopa* perforated the corolla-tube of a salver-shaped flower. *G: D.* (3064)

Meeting (52nd) of German naturalists and physicians in Baden-Baden. (Psyche, May [4 Nov.] 1881, v. 3, p. 211, 27 cm.)

Abstract, in English translation, of M. von Hopffgarten's notice of 52nd meeting of German naturalists and physicians in Baden-Baden, from *Entom. Nachrichten*, 1 Apr. 1880, jahrg. 6, p. 65-70; notes on the geographical distribution of certain *tipulidae* and proposition of the establishment of an entomological loan-library in Germany (by C: R. Osten Sacken); minor communications. *B: P. M.* (3065)

Mische, W: For sale. (Psyche, 1880, v. 3, p. 11, 24, 48, 60, *each* 4 cm.)

Advertisement of coleoptera for sale. *B: P. M.* (3066)

Moody, H: Loring. Larvae of the family *pyrochroidae*. (Psyche, June [13 Aug.] 1880, v. 3, p. 76, 23 cm.)

Distinctive characters of larvae of *dendroides canadensis*, *d. concolor*, *pyrochroa flabellata* and *schizotus cervicalis*. *G: D.* (3067)

Moody, H: Loring. Transformations of *nacerdes melanura*. (Psyche, May 9 [July] 1880, v. 3, p. 68, 19 cm.)

Description of egg of *nacerdes melanura;* results of experiments to ascertain the food of the larva. *B: P. M.* (3068)

Mummy of a wasp. (Psyche, July [16 Dec.] 1882, v. 3, p. 368, 10 cm.)

Note, from Maspero and Brugsch's "La trouvaille de Deir-el-Bahari," on the antiquity of a wasp found in the coffin of Amenophis I who died 1668 B. C. *G: D.* (3069)

Murie, James, *see* Linnean society of London [Rec., 3046-3047].

Murtfeldt, Mary Esther. A fragrant butterfly. (Psyche, Apr. [18 Aug.] 1881, v. 3, p. 198, 12 cm.)

Notice, [by C: V. Riley], entitled "Odor in butterflies." (Amer. nat., Oct. [23 Sep.] 1881, v. 15) (Riley, C: V. Entomology ...[Oct. 1881]), p. 822.

Notes a delicate violet-like odor in males of *callidryas eubule*. *G: D.* (3070)

Murtfeldt, Mary Esther. The grapeberry moth, *eudemis botrana*, S. V. (Psyche, Oct.-Dec. 1881 [7 Apr. 1882], v. 3, p. 276, 11 cm.)

The larva of *eudemis botrana* feeds upon *vitis*, *vernonia noveboracensis*, *liriodendron* and *amorpha*. *G: D.* (3071)

Murtfeldt, Mary Esther. Habits of *hypoprepia packardii*, Grote. (Psyche, July-Sept. 1881 [7 Mar. 1882], v. 3, p. 243-244, 46 cm.)

Describes larva of *hypoprepia packardii*, which feeds on *quercus tinctoria*. *G: D.* (3072)

Murtfeldt, Mary Esther. *Xylocopa* and *megachile* cutting flowers. (Psyche, May [19 Aug.] 1882, v. 3, p. 343, 9 cm.)

Flowers of *plumbago* and of other plants are cut by species of *xylocopa* and *megachile*. *G: D.* (3073)

Noel, Paul. Chasse aux lépidoptères nocturnes [Rec., 1541].

Abstract. (Psyche, Feb. [6 Mch.] 1880, v. 3, p. 23, 4 cm.)

G: D. (3074)

Orne, J:, *jr.*, *see* MANN, B: P. George Dole Smith [Rec., 3054].

Osborn, Herbert. Habits of *thrips*. (Psyche, July [16 Dec.] 1882, v. 3, p. 369, 12 cm.)

Crit. rev., by T. Pergande, with same title. (Psyche, Aug. 1882 [15 Jan. 1883], v. 3, p. 381, 20 cm.)

Regards a species of *phloeothrips* as injuring apple-blossoms by biting into the young styles and thus preventing fertilization. *G: D.* (3075)

Osten Sacken, C: Robert. Ants and aphides. (Psyche, May [19 Aug.] 1882, v. 3, p. 343, 14 cm.)

Notice of W: Trelease's "Unusual care of ants for aphides" (Psyche, Feb. [24 May] 1882, v. 3, p. 310-311) [Rec., 3095], together with a translation of a note on this subject published earlier by the author (Entom. Zeitung . . . zu Stettin, 1862, jahrg. 23, p. 127-128). *G: D.* (3076)

Osten Sacken, C: Robert. Habits of *bombylius* [Rec., 3520].

Reprint, with same title. (Psyche, Oct.-Dec. 1881 [7 Apr. 1882], v. 3, p. 290, 17 cm.)

B: P. M. (3077)

Osten Sacken, C: Robert. Note on North American *trypetidae*. (Psyche, April [28 May] 1880, v. 3, p. 53, 21 cm.)

Notes on the 6 species of N. A. *trypeta* of which the food-plant is known. *G: D.* (3078)

Parker, H: Webster. Note on *deilephila lineata*, Fabr. (Psyche, May [19 Aug.] 1882, v. 3, p. 342, 12 cm.)

Habits and occurrence of imagos of *deilephila lineata*. *G: D.* (3079)

Pergande, Theodor. Habits of *thrips*. (Psyche, Aug. 1882 [15 Jan. 1883], v. 3, p. 381, 20 cm.)

Critical review of H. Osborn's "Habits of *thrips*" (Psyche, July [16 Dec.] 1882, v. 3, p. 369) [Rec., 3075], with other notes on species of *thrips*. *G: D.* (3080)

Proceedings of societies, *see the names of the respective societies.*

Reed, Edmund Baynes. Canadian entomologist. (Psyche, 1881-1882, v. 3, p. 216, 228, 260, 292, 304, 316, 336, 348, *each* 3 cm.)

Advertisement of *Canadian entomologist* and of Annual report of the Entomological society of Ontario for subscription. *B: P. M.* (3081)

Riley, C: Valentine. Galls and gall insects. (Psyche, 1880-1882, v. 3, p. 11, 24, 48, 60, 72, 84, 96, 108, 170, 182, 194, 206, 218, 230, 262, 294, 306, 318, 338, 350, 362, 374, 386, *each* 3 or 4 cm.)

Advertisement for galls and gall insects. *B: P. M.* (3082)

[**Riley**, C: Valentine.] A new museum pest. (Amer. nat., Oct. [28 Sep.] 1882, v. 16) (RILEY, C: V. Entomology...[Oct. 1882]), p. 826.

Reprint, with same title. (Psyche, Sep.-Oct. 1882 [1 Mar. 1884], v. 3, p. 408, 6 cm.)

Discovery, by Mrs. A. E. Bush, of *perimegatoma variegatum* as a pest in collections of insects. *B: P. M.* (3083)

[**Schaupp**, Frank G:] Bulletin of the Brooklyn entomological society. (Psyche, 1881-1882, v. 3, p. 216, 228, 260, 292, 304, 316, 336, 348, *each* 3 cm.)

Advertisement of Bulletin of the Brooklyn entomological society for subscription. *B: P. M.* (3084)

Sclater, Philip Lutley, *see* ZOOLOGICAL society of London [Rec., 3100].

Scudder, S: Hubbard. Early stages of butterflies wanted. (Psyche, 1880-1882, v .3, p. 2, 14, 26, 50, 62, 74, 86, 98, 110, 122, 134, 146, 158, 170, 182, 194, 206, 218, 230, 262, 294, 306, 318, 338, 350, 362, 374, 386, *each* 4 cm.)

Advertisement. *B: P. M.* (3085)

Scudder, S: Hubbard. Fragments of the coarser anatomy of diurnal lepidoptera. (Psyche, v. 3: Oct.-Dec. 1881 [7 Apr. 1882], p. 263-275, 443 cm.; Jan. [29 Apr.] 1882, p. 295-298, 125 cm.; Feb. [24 May] 1882, p. 307-309, 94 cm.; Mar.-Apr. [24 June] 1882, p. 319-321, 101 cm.)

Reprint, with same title. Cambridge, 1882. t.-p. cover, t.-p. [+ 1] + 83 p., 19.5 × 12.5, t 10 × 6.

Notice, by G: Dimmock, entitled "Book notice." (Psyche, June [13 Oct.] 1882, v. 3, p. 354.) [Rec., 2968.]

Notice. (Nature, 3 Aug. 1882, v. 26, p. 330-331, 2 cm.)

Notice. (Zool. Jahresber. f. 1882, 1883, abtheil. 2, p. 145.)

Anatomy of the different systems of internal organs in larvae and pupae of some species of diurnal lepidoptera. *G: D.* (3086)

Scudder, S: Hubbard. Gosse's observations on the butterflies of North America. (Psyche, July.-Sept. 1881 [7 Mar. 1882], v. 3, p. 245-247, 77 cm.)

Review of H: Gosse's "The Canadian naturalist' . . . Lond., 1840 [Rec., 2500], and of his "Letters from Alabama" . . . Lond., 1859 [Rec., 2501], with annotated index of the species of rhopalocera mentioned in the two works. *G: D.* (3087)

Scudder, S: Hubbard. Homologies of the cremaster. (Psyche, Mar. [25 July] 1881, v. 3, p. 186, 10 cm.)

Defends the view "that the body of the cremaster of the chrysalis corresponds to the anal plate (or terminal segment) of the caterpillar." *G: D.* (3088)

Scudder, S: Hubbard. Some recent publications on fossil insects. (Psyche, Nov. 1880 [22 Mar. 1881], v. 3, p. 138, 23 cm.)

Reviews Herbert Goss' "Three papers on fossil insects" . . . (Proc. Geologists' assoc., Lond., 1878-1880, v. 5-6) and "The geological antiquity of insects" . . . Lond., 1880, by the same author. *G: D.* (3089)

Snow, Francis Huntington. Larva of *eurycreon rantalis* Guen. (Psyche, Oct. 1880, [12 Feb. 1881], v. 3, p. 127, 23 cm.)

Describes the larva of *eurycreon rantalis*, and gives list of its six known food-plants. *G: D.* (3090)

Snow, Francis Huntington. *Musca domestica* Linn. versus *vespa occidentalis* Cresson. (Psyche, May [19 Aug.] 1882, v. 3, p. 339, 31 cm.)

Notice. (Zool. jahresbericht., 1882, 1883, abtheil. 2, p. 327, 379.)

Notice of great destruction of *musca domestica* by *vespa occidentalis*. *G: D.* (3091)

Snow, Francis Huntington. A new museum pest, *trogoderma tarsale* Mels. (Psyche, June [13 Oct.] 1882, v. 3, p. 351-352, 37 cm.)

Describes larva and pupa of *trogoderma tarsale*, which is common in Kansas, as a museum pest. *G: D.* (3092)

Society meetings. (Psyche, 1880-1882, v. 3, p. 11, 23, 47, 59, 71, 83, 95, 107, 119, 131, 143, 167, 179, 191, 203, 215, 227, 259, 291, 303, 315, 335, 347, 360, 372, 384.)

Current announcements, with occasional changes, of the times of meeting of the different entomological societies of North America. *G: D.* (3093)

Stebbins, Solomon. North American ferns. (Psyche, 1880-1882, v. 3, p. 11, 24, 144, 156, 168, 180, 192, 204, 216, 228, 260, 292, 304, 316, 336, 348, 350, 362, 374, 386, *each* 3 cm.)

Advertisement of check-lists of the ferns [*filices*]. *B. P. M.* (3094)

Trelease, W:, *secretary*, *see* CAMBRIDGE entomological club [Rec., 2951-2953].

Trelease, W: Review. (Psyche, Jan. [27 June] 1881, v. 3, p. 175, 25 cm.) [Rec., 2738].

Trelease, W: Unusual care of ants for aphides. (Psyche, Feb. [24 May] 1882, v. 3, p. 310-311, 67 cm.)

Notice, by C: R. Osten Sacken, entitled "Ants and aphides." (Psyche, May [19 Aug.] 1882, v. 3, p. 343, 14 cm.)

Crematogaster lineolata erects a shelter to protect aphides. *G: D.* (3095)

Turner, H: Ward. Color of the light emitted by insects. (Psyche, Feb. [24 May] 1882, v. 3, p. 309, 9 cm.)

Color of light emitted by *pyrophorus noctilucus*, *photuris pensylvanica* and *photinus pyralis*. *G: D.* (3096)

Wailly, Alfred. Lepidoptera. (Psyche, 1880-1882, v. 3, p. 12, 24, 48, 60, 72, 84, 96, 108, 120, 132, 144, 156, 168, 180, 192, 204, 216, 228, 260, 292, 304, 316, 336, 348, 350, 362, 374, 386, *each* 3 cm.)

Advertisement for living pupae and eggs of American lepidoptera wanted. *B: P. M.* (3097)

Wailly, Alfred. Notes on a few American bombyces. (Can. entom., Nov. 1880, v. 12, p. 227-228.)

Duplicate article [slightly different], entitled "Notes on a few bombyces, hybrids, etc." (Psyche, Sept. [15 Dec.] 1880, v. 3, p. 112-113, 48 cm.)

Notes on species of the genus *attacus* and their hybrids. *G: D.* (3098)

Wier, J: Jenner. Danaine butterflies not subject to the attack of mites. (Entomologist, July 1882, v. 15, p. 160-161.)

Reprint, with same title. (Psyche, Sep.-Oct. 1882 [1 Mar. 1884], v. 3, p. 408, 12 cm.)

Review of remarks by R. Meldola on the exemption of *papilio pammon* and species of *euploea* and *danais* from injury by mites [*psocidae*] in collections; confirmation of this exemption in author's experience. *B: P. M.* (3099)

Wilson, Joseph Martin, *see* EDWARDS, W: H: *and* WILSON, J. M. Chemical change . . . [Rec., 2993].

Zoological society of London. (Psyche, June [18 Nov.] 1881, v. 3, p. 224, 5 cm.)

Extract from minutes of meeting of Zoological society of London, 15 Feb. 1881, published in *Zoologischer Anzeiger*, 7 Mch. 1881, jahrg. 4, p. 117-118, by P. L. Sclater; remarks on a hymenopterous parasite of two species of *linyphia* (by O. P. Cambridge); reference to a paper read by T: De Gray (*Lord Walsingham*) on North American *tineidae*. *B: P. M.* (3100)

Nos. 101-102 were issued 1 March 1884.

SYSTEMATIC INDEX TO PSYCHE, VOL. 3.

(According to the Dewey decimal system.)

BY GEORGE DIMMOCK.

[The Index to volume 2 of Psyche was based upon the Dewey decimal classification (Amherst, *author*, 1876), which had, however, by its author, been developed only to three places of decimals. For all extensions of the system into greater detail the author of that index was solely responsible. In the use of the system some errors were committed, and in its extension some inconsistences, which have been avoided in the present index. The authorized extension of the system, the publication of which has been expected soon, for the last two years or more, did not appear until October 1885. The final revision of the following index, mostly in manuscript, was not therefore possible until after that date. This index has now been made to correspond, in its details, with the new edition of the Dewey decimal classification and relative index (Boston, *Library Bureau*, 1885), a work indispensible to every possessor of a library, or worker with literary material.

In addition to the correction of errors, as compared with the index to volume 2 of Psyche, a few charges have had to be made in consequence of minor changes (which are however great improvements) in the authorized index itself. *B: Pickman Mann.*]

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CORRECTIONS.

(See v. 1, p. 246, and v. 2, Index, p. 19. The corrections given below are in addition to those already given.)

The passages indicated should read as follows.

In volume 1.

p.	col.	l.	
96		—6	Dilar
101		21	269-274.
231	1	3	152, 164, . . .
39		11	fig. 20-21. *t.* Annual

In volume 2.

p.	col.	l.	
47		—16	Description
159		17	beneficial, and . . .
293		6	Westcott. . . .
309	1	—14	749-752 | 24

In volume 3.

(See also v. 3, p. 155 and p. 291, col. 1, last two paragraphs.)

p.	col.	l.	
16	1	21	*broad black*
27	1	9	remains for me . . .
27	2	—14	arthropod eye.³
28	2	1	Mr. N. Sograff . . .
30	2	18	*Amblychila cyl-*
32	2	—9	Pérez . . .
33	1	10	Pérez . . .
34	1	—8	Wolff . . .
34	2	21	*Thysanura;*
35	2	—1	Félix . . .
41	1	1	oblique
41	2	20	is to be found . . .
53	1	9	of the eyes, pale . . .
63			*Insert* PSYCHE at top of p.
64	1	2	in rearing this species
64	1	—6	*Glyphipterygidae*, but
64	2	—3	mine of *Aeaea* . . .
113	2	—4	'*argumentum ad*
113	2	—3	*hominem*' . . .
113	2	—1	all its stages."
135	2	1	they are at least one-third . . .
147	2	—1	long, where it . . .
148	2	—1	means of progress . . .
149	2	10	first three having . . .
171	1	2	p. 126). . . .
171	2	—11	one on segment 11
172	1	—9	"In the fifth . . .
172	1	—1	crowns of spurs on . .
174	1	1	of eggs to cocoon, . . .
197	2	—8	arid, barren
233	2	—14	(*c*) is omega-form . .
234	1	19	*aid* in suction, for . . .
239	2	9	accuracy, al-
240	1	3	pump, or bulb,
241	1	—17	Texas, its favorite . . .
241	2	—12	segment, is re-
244	2	—1	dense, rose-colored . .
263		4-5	*Transpose these lines.*
263	1	13	Swammerdamm in his
323	2	19	vessels),
325	2	5	*strike out* FIG. 5.
1		—10	ADVERTISEMENTS--Acknowledgments....
21	1	2	*Montpellier. Section de*
21	2	—7	8 Sept. 1879. jahrg. 2. p. 480;
22	2	12	**Mocquerys**, Simon....
27	1	—2	organes et fonctions...

29	2	—4 . . .	v. 1, p. 316....
30	1	—6	"Neue Denkschr....
33	1	—2	Germar Ballière...
45	1	20	journ., 1879, v. 15,p. 73.
45	2	4	49 cm.)
46	1	3 . . .	col. 1, 29 cm.)
46	1	28	**Noël**, Paul....
47	1	—16	*ium.—Mo. journ. sci.*...
47	1	—16 . . .	v. 1, p. 765.
55	2	—24 . . .	*stiretrus diana.*
57	1	24 . . .	t 23 × 17.2.
58	1	1	*Strike out* [*sic*]
58	2	29 . . .	G: Hazen **French**....
59	1	6 . . .	author of the...
70	1	—4	terlingen....
77	1	—15	probosces of...
79	1	9 . . .	p. 263-604. Mün-
79	1	25 . . .	(Denkschriften d....
81	2	—12 . . .	Oct. 1879, an. 9, p.
83	1	—22 . . .	Swammerdamm, the
92	1	—16 . . .	Beispiel von...
83	1	—18 . . .	Swammerdamm-Medal, to
83	1	—15	Swammerdamm worked.
95	1	17 . . .	the codling moth.—
106	2	18 . . .	causes de réinvasion
115	2	12 . . .	(Mo. journ.
116	1	—31	1879, v. 89, p....
117	1	4 . . .	22 Nov. 1879, v. 41,
117	2	—5 . . .	(Mo. journ.
118	1	13 . . .	*saprolegnia ferox*....
122	1	18	*form*, to the
129	2	1 . . .	appendages,
129	2	—18 . . .	42 cm.)
129	2	—10 . . .	21 cm.)
130	1	14	1880, an. 10, p....
130	1	—8 . . .	June 1880, y. 15, p. 941-955.)
130	2	9	**De Gray**, T:, *Lord*...
130	2	16	13, no. 210,...
138	2	28 . . .	in this field,
139	1	—17	[**California**—*State*...
142	1	7 . . .	Mesalliance.
150	2	—22 . . .	Honey Ant."
151	1	17 . . .	1880, v. 90, p. 41-43.)
151	2	1	**Darwin**, C:...
151	2	—15 . . .	August; Notice...
153	1	15	t 15 × 8.3....
153	1	32	**Moggridge**, J. Traherne....
153	1	35	p. 256-258, pl. 16.)
153	1	—16	insects. (Journ....
153	2	22	152 Abbildungen...
154	1	24 . . .	4 Sept. 1880, p. 4, 24 cm.)
157		—8 . . .	PROMETHEA — *W: H: Edwards*...
162	1	—7 . . .	*Mantispa* and
164	1	—7 . . .	flowers. (Nature,
165	1	17	66.)
166	1	19	89, p. 774-776.)
175	1	2 . . .	FEB. 1881.
176	1	16	chauffour. [Biog....
176	1	20	6, p. 150.) (Entomologist,...
176	1	21	p. 119.) (Entom....
176	2	24	119.) (Zool....
177	1	22	tices.] (Colonies...
177	1	—6	[32 p.]" [According...
177	2	1	**Guenée**, Achille....
177	2	7 . . .	Guenée." (Entomol-
177	2	—13...	August. [Biog....
186	1	—5...	by Drs. Manson...
187	1	—18...	v. 1, p. 10-11.)
187	1	—5...	(Papilio,...
188	2	19...	news, 15 Mar....
189	1	9	p. 176-184, 9 fig.)
200	1	—22...	p. 689-690.)
200	1	—13...	City [Mo.] journal, 22 Aug.
200	1	—5...	nat., Feb....
201	1	28...	Ueber die...
201	2	7...	Nervensystems der In-
211	1	24...	p. 65-70,...
212	2	18	**Chambers**, [Vactor] T[ousey]....
213	2	5	Pétersbourg, 1877....
214	1	—26...	Fertilisation of...
214	1	—20...	fertilisation of...
215	1	21...	*Peripatus ed-*
215	1	22...	at Carácas and...
215	1	—8	15, p. 262.
215	2	8	14 Jan. 1881. ...
225	1	18...	v. 1, p. 19-28.)
225	2	9...	v. 1, p. 4-6.)
226	1	—21...	Ueber den...
226	2	26, 27	[Dele these two lines.]
232	1	—4...	Dissertatio de

Explanation of plate 1, line—9....origin of these muscles.

247	2	—25	*Papilio asterias*...
249	2	28	tigung der von...
249	2	29	...Bestäubungseinrichtung von
250	1	—12	...by Julius Victor Carus,...
251	1	37	...the hybrid nature...
251	2	15	...by Julius Victor Carus...
252	2	16	...28 giugno 1868.]...
253	1	—25	of *angraecum*...
253	2	18	cross fertilization...
259	1	—16	...the successor of...
261		—10	...NEPTICULA PTELIAEELLA,...
277	1	19	...*Corydalus*
278	1	—11	...Wissenschaft und Kunst,...
280	2	7	...**Böttner**, Hartmann....
281	2	4	...**Keferstein**, George Adolf...
281	2	—9	...**Krancher**, Oskar Paul....
282	1	7	...**Latzel**, Robert....
283	1	31	...Theorie Darwins...
283	2	17	...ative embryology. (Amer....
283	2	—14	...leaf cutting ant.
284	2	5	...p. 44-46, 8 fig.)
286	1	14	...**Müller**, Hermann....
288	1	4-5	Reprint, entitled, "Carnivorous plants and their prey." (Hardwicke's science gossip, Dec. 1874, v. 10, p. 272-275, fig. 179-182.)
288	1	12-13	**Riley** C: Valentine. Carnivorous plants and their prey. (Hardwicke's science gossip, Dec. 1874, v. 10, p. 272-275, fig. 179-182.)
290	1	—12	a bruised finger,...
291	1	20	...Museum,
291	1	—18	Jones, of Breton,...
313	1	5	chauffour. [Biog....
313	1	7	OBERTHÜR, C:...
328	1	—13	...(*Aphrodite*, etc.)
330	1	14	...1881. 15 + 141
330	1	18	...[June] 1882, v 3,...
332	2	—9	...**Paterson**, Alexander....
334	2	—19	...soc., Edinburgh, 9 Dec....
335	1	—21	...vote or to hold
345	1	—26	...Strange habit of *met-*
346	1	7	**New** insects injurious to...
356	2	18	...1881, v. 13, p....
359	2	13	...Osborn, of Ames...
369	2	6	...Annexe to André's
386	2	8	pondence is...
386	2	27	*tera, Coleoptera*,...
408	1	6	*tomologische*...
414	2	—6	...in *Danais archippus.*
416	2	—12	Mr. R. Hayward showed...
421	1	6	...383, 2 cm.)
422	2	—14	...the mouth-parts
423	2	11	...*pterophoridae* of North America.
426	2	—25	fly. (Psyche,...
427	2	24, 25	...405-406, 418-430.)
428	1	28	...1882 [15 Jan....
430	2	—22	**Weir**, J:...
432	1	—12	win, C:, 1671, 1810,...
432	2	18	...W: H:, 1463-1465,...
432	2	24	...G:, 2393 (2394),...
433	1	—17	...2875, 3043 (3023), 3044.
433	1	—8	...2515, 2888 (2880), 2889,
433	2	6	...Lubbock, (1732), (1734),
435	1	—15	2920 (2907, 2919), 3032.
435	2	1	...2360; of Brit....
435	2		*Insert at end of page:*

060. General societies. British mus., 1942, 3016-3017. Centennial Exposition [Philadelphia], 1822. Genootsch. t. bevord. v. nat. genees. en heelk. t. Amsterdam., 3004. Germ. nat. and physicians., 3022, 3065. Middlesex inst., 2951. Royal mus. Stockholm, 3016. Smithsonian inst., 3019.

2. RELIGION.

290. Non-christian Religions. Worship of insects, 1588.

3. SOCIOLOGY.

343. Criminal law. Prosecution of collectors, 3014, 3029. Prosecution of insects, 3014.

435	1	12	... *Add* Phylloxera congress, 3007.
435	1	19	... *Add* of Cal. viticult. comm., 1984, 2009, 2082.

435	1		*Insert after line —18:* **39. CUSTOMS.** **3916. Care of the person,** 1703, 1729. **3917. Ornaments.** Pyrophorus, 1652. **3933. Embalming.** Mummy of a wasp, 3069.
438	1	10-11	**58153. Food habits of plants.** *Capture of animals by plants for food,* 2347, 2407. *By leaves.* Sarracenia, 285 (2599), 2598 (2599), 579...
438	1	—14	*This line should not begin a new paragraph.*
438	2	17	... Asclepias, 1574, 2227, 2510,
438	2	28	2175, 2366, ...
438	2	—14	**5819.** GEOGRAPHICAL DISTRIBUTION.
438	2	—5	2558. Portugal, ...
439	1	23	*Insert before this line:* **591.** *PHYSIOLOGICAL ZOOLÒGY.*
439	2	13	Diadema, 2013. Ėpicalia, 1762. Numenia, 1643.
439	2	—18	... 2962; *of cold.* ...
440	1	20	*Parasitism. By fungi,*...
440	1	—4	... Phalangiidae, 2228.
440	2	44	... Xyleutes,
442	1	—12	... Acridiidae, 2775. ...
442	2	—2	Apis, 1794, 1969, 2197, 2536, 2624, 2646, 2678, 2724, 2728, 2762, 2778 ....

10	2	10	. . . *G: D.* (1479)
10	2	—1	. . . *B: P. M.* (1487)
22	2	14	M. Mocquerys, coleopterist, . . .
40	2	—10	. . . or fruit-buds.
50	2	—29	. . . *nicotiana rustica* . . .
57	1	—1	. . . *G: D.* (1602)
58	1	—24	. . . of *aphididae* and . . .
58	2	—11	*spirobolus;* one . . .
70	1	—12	optera injurious . . .
78	2	—7	. . . name, the . . .
118	1	18	. . . is *saprolegnia ferox,* . . .
118	2	—4	from *Pall Mall Gazette* . . .
129	2	—17	. . . canton of Aargau, . . .
139	2	—12	. . . *antheraea paphia* . . .
139	2	—2	Correction to the author's . . .
142	1	5	. . . *cicindela;* notes
151	2	—17	. . . is a syn-
152	1	—9	. . . *Hedymeles ludoviciana* . . .
152	1	—7	. . . *G: D.* (2026)
153	2	—19	. . . Commission impériale archéologique . . .
154	1	—11	. . . silk cul-
154	1	—2	. . . its habits are those of *a.*
155	2	—19	55 2 —5 . . .
105	2	10	Phosphorescence of a . . .
105	2	14	**Joly**, Émile, . . .
166	1	12	. . . [Rec. 2121].
165	1	30	. . . *G: D.* (2113)
176	2	—9	temberg. B. 17 . . .
177	2	—10	Herr Hartmann, . . .
188	1	3	. . . *lerema accius* and . . .
188	1	—19	. . . *psylla celtidis-mamma,* . . .
188	1	—13	*campa silvatica,* . . .
188	2	28	. . . *corydalus brongniartii* (Au-
189	2	—17	. . . *B: P. M.* (2207)
190	1	—24	earwigs . . . [Rec., . . .
190	2	23	. . . into imagos resembling . . .
212	2	25	an insect of the same . . .
213	1	—5	Planta-Reichenau. . . .
214	2	8	Authorization of the . . .
250	1	16	opment. Similar . . .
251	2	—19, —10,	Germ. tr., by J. V. Carus, of . . .
253	1	—22	fertilize *angraecum* . . .
257	1	—15	of ants and grasshoppers . . .
257	2	11	. . . *mauritia cararа́*
258	2	—3	. . . *cissus, eucomis,*
282	1	11	. . . *notiphilodes,* based
282	2	—8	. . hibernation in houses.
283	2	—4	. . . *pyrrhocoris apterus* . . .
302	1	28	. . . believing in the . . .
302	1	—15	. . . *gomphocarpus,* etc.
302	2	—5	. . . [Rec., 2637], showing . . .
314	1	14	. . . in the *Sächsischen* . . .
314	2	24	. . . by diptera. The pollina-
330	1	—19	. . . [Rec., 2591] . . .
332	1	5	*sostigma*" (Nature, . . .
332	1	31	. . . honey-bees" (Proc. . . .
332	1	38	. . . and uses" . . .
332	1	43	. . . *pelia*" (Proc. . . .
344	2	—10	. . . *Microcentrum retinerve* eat . . .
418	1	20	. . . *G: D.* (2908)

3 2044 093 385 193